

THE
ANSONIA **BRASS**
AND **COPPER** **CO.**
MANUFACTURERS OF

BRASS AND COPPER

Seamless Tubes, Sheets, Rods and Wire.

Ingot Copper.

SOLE MANUFACTURERS

Tobin Bronze

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round, Square and Hexagon Bars, for Pump Piston Rods and Bolt Forgings.

19 & 21 Cliff Street, - - New York.

THE New Haven Copper Co.,

SOLE MAKERS OF

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

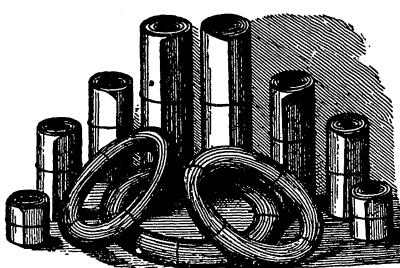
ALSO MANUFACTURERS AND
DEALERS IN

BRAZIERS' & SHEATHING COPPER,

Kettles, Bottoms, Bolts, Circles, &c.,
ALSO MANUFACTURERS OF

Cast Steel Angles and Bits of Superior Quality.

294 Pearl St., - - NEW YORK.



Waterbury Brass Co.

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and German Silver Wire, Brass and Copper Tubing,

COPPER RIVETS AND BURS

PERCUSSION CAPS,

TAPE MEASURES,

METALLIC EYELETS,

Brass Kettles, Brass Tags, Powder Flasks,

Shot Pouches, &c.,

AND SMALL BRASS WARES OF EVERY DESCRIPTION.

HICK'S PRIMERS, BERDAN PRIMERS.

Cartridge Metal in Sheets or Shells a Specialty.

Sole Agents for the CAPEWELL MFG. CO.'S Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Providence, R. I. 38 Mechanic St., Newark, N. J.

MILLS AT WATERBURY, CONN.

WHEN IN WANT OF
ANYTHING IN

BRASS AND COPPER

RITE
ROME BRASS & COPPER CO.,
ROME, N. Y.

MATTHIESSEN & HEGELER ZINC CO.,

LA SALLE, ILLINOIS,

SMELTTERS OF SPELTER

AND MANUFACTURERS OF

SHEET ZINC AND SULPHURIC ACID.

Special Sizes of Zinc cut to order. Rolled Battery Plates.

Selected Plates for Etchers' and Lithographers' use.

Selected Sheets for Paper and Card Makers' use.

Stove and Washboard Blanks.

ZINCS FOR LECLANCHE BATTERY.

BRASS GOODS MFG. CO.,

Mrs. of Stamped Brass, Silver and Nickled Goods, Brass Labels for Cans and Rubber Moulds,

BRONZE DOOR KNOBS

Bronze and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

MANUFACTURERS OF
Drop Hammers, Turnbuckles and Parallel Vises.

MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E.D., N.Y.

HENDRICKS BROTHERS,
Proprietors of the
Belleville Copper Rolling Mills,
Manufacturers of
Braziers', Bolt and Sheathing
COPPER.
COPPER WIRE AND RIVETS.
Importers and Dealers in
Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.
49 CLIFF ST., NEW YORK.

THE PLUME & ATWOOD MFG. CO.

MANUFACTURERS OF

Sheet and Roll Brass

—AND—
WIRE,

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURRS, COPPER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain, Kerosene Burners, Lamp Trimmings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL, THOMASTON, CONN.

FACTORIES: WATERBURY, CONN.

SCOVILL MFG. COMPANY,

Manufacturers of

BRASS

Sheet, Wire, Tubes.

BUTT HINGES,

BUTTONS,

LAMP GOODS,

NOVELTIES,

PURE ALUMINUM

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

428 Broome Street, New York.

210 Lake Street, Chicago.

84 Summer Street, Boston.

JOHN DAVOL & SONS,

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

COPPER, TIN, SPELTER, LEAD, ANTIMONY.

100 John Street, - - New York.

WILLIAM S. FEARING.

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

Sheet Brass, Fancy Sheet Brass, German Silver, Copper, Brass and German Silver Wire,

Brazed and Seamless Brass and Copper Tubes, Brass and Copper Rods, Brass Ferrules, Pure Copper Wire,

Sheet and Ingot Copper, Spelter, Tin, Antimony, Lead, &c.

ACID RESISTING

Deoxidized

Bronze,

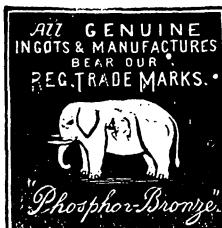
Copper or Brass, also Aluminum, Phosphor Bronze and Compositions of all kind in Ingots, Wire Bars and Castings.

Large Castings a Specialty.
Babbitt Metals.

BRIDGEPORT DEOXIDIZED BRONZE and METAL CO.,

Bridgeport, Conn.

ELEPHANT BRAND



PHOSPHOR-BRONZE
INGOTS, CASTINGS, WIRE, SHEET &c.
THE PHOSPHOR-BRONZE SMELTING CO. LIMITED
2200 WASHINGTON AVE., PHILADELPHIA, PA.
ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.

PHOSPHOR BRONZE.

Parsons' Manganese Bronze and White Brass.

MADE IN THE UNITED STATES EXCLUSIVELY BY

**THE WILLIAM CRAMP & SONS SHIP and ENGINE BUILDING CO.,
PHILADELPHIA, PA.**

MANGANESE BRONZE PROPELLERS

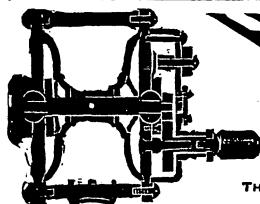
— ARE USED BY THE —

Cunard, Pacific Mail, Hamburg American, White Star, International, Morgan, Canadian Pacific, North German Lloyds and many other Steam Ship Companies, and principal Naval Powers.

Parsons' White Brass; the Most Approved Anti-Friction Metal.

8. DOUGLAS PETRIE, Agent,

Nos. 39 & 41 Cortlandt Street, New York.



HENDRYX
Solicits Correspondence about
Fishing Reels for 15 Cents to 20 Dollars each.
Brass Bird Cages " 50 " " 12 " "
Japanned " 25 " " 10 " "
Standard Bronze, Brass and Steel Chain.
Standard Wire Picture Cord.

THE ANDREW B. HENDRYX CO., NEW HAVEN, CONN., U. S. A.



THE F. L. GAYLORD CO.,

MANUFACTURERS OF

Heavy and Light Brass, Bronze, Composition and Pure Aluminum Castings.

THOS. L. FOWLER & CO., Agents,

55 Fulton St., New York City.

OILLESS BEARINGS

For Loose Pulleys and other bearings. Perfectly clean. No cutting or danger of fire from over-heating. Send for Loose Pulley circular.
North American Metalline Co., 43 to 49 Third Street, Long Island City, N. Y.

**THE CRAMP METAL MFG. CO.,
OLNEY, PHILADELPHIA.**

SHEET COPPER.

PATENT LEVELED, TINNED,
COLD ROLLED, POLISHED.

THE CRESCE **TRY IT!**
NT BRAND AND YOU WILL USE NO OTHER
THE CRESCE **PHOSPHOR**
TIN.
THE HIGHEST AND
RICHEST GRADE MADE.
MANUFACTURED ONLY BY
THE CRESCE PHOSPHORIZED METAL CO.
OFFICE AND WORKS
2107 2109 2111 INDIANA AV. PHILADELPHIA, PA.

CROWN SMELTING COMPANY,

Chester, Pa.

Bronze, Brass and Composition Castings.

Inventors and Sole Manufacturers of

"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."

Manufacturers of PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.

Specifications in ingot metal or castings.

The W. W. & R. M. KEYS CO.,

Bronze, Composition and Brass Castings of all kinds, also Babbitt Metals.

BRIDGEPORT, CONN.



Manufacturers all grades Babbitt Metals, Solder, Bar Tin, Bar Lead, Lead Car Seals, etc.

PHOSPHOR-TIN

BY USING MY PHOSPHOR TIN MANUFACTURERS CAN MAKE ANY DESIRED GRADE OF PHOSPHOR BRONZE THEMSELVES, BY THE SIMPLE PROCESS OF MELTING, MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET. NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICES ADDRESS HALK & NAUMANN NEW-YORK SOLE AGENTS FOR THE U.S. AND CANADA. S. & F. EARL ST.

The American Metal Co.

(LIMITED),
Levin Building, 80 Wall St., New York.]
P. O. BOX 957.

COPPER, COPPER ORES AND MATTES.

TIN, LEAD, SPELTER, ANTIMONY, NICKEL, ALUMINUM, BULLION, IRON.

Advances made on Consignments

AGENTS FOR
Henry R. Merton & Co., - - London.
Metallgesellschaft, Frankfort-on-Main.
Williams, Foster & Co., Ltd., Swansen.

Boston Casting Co., 122 W First St.,
MANUFACTURERS OF So. Boston, Mass.
WROUGHT IRON
CASTINGS.

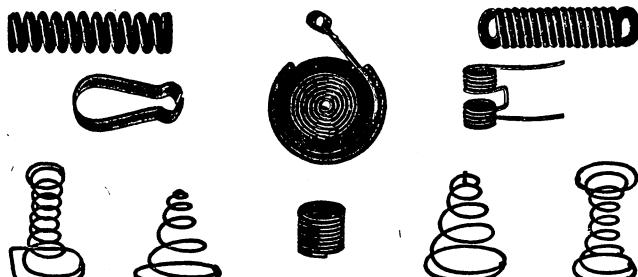
We make sound, soft Wrought Iron Castings with a tensile strength of 60,000 to 70,000 pounds per square inch and guarantee the same to be expressly adapted for mechanical and electrical work. The castings will be true to pattern with a shrinkage of one quarter of an inch to the foot. This company is in no way connected with any other.

WASHBURN & MOEN MANUFACTURING CO.,

WORKS IN WORCESTER, MASS., and WAUKEGAN, ILL.
MAKERS OF IRON, STEEL AND COPPER

EVERY VARIETY OF WIRE FOR ALL PURPOSES.
FINE OIL TEMPERED SPRINGS A SPECIALTY.

**SPIRAL
FURNITURE,
BED AND
SPECIAL
SPRINGS.**



FLAT
CLOCK
and
WATCH
SPRINGS.

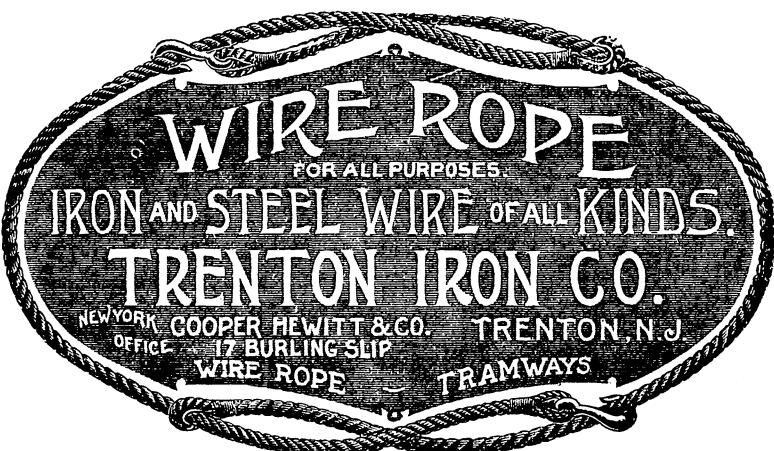
EXPORT ORDERS PROMPTLY FILLED.

Warehouses: 16 Cliff and 241 Pearl Sts., New York; 107 & 109 Lake St., Chicago; 8 & 10 Pine St., San Francisco; Houston, Texas.

WM. MCFARLAND,
IRON FOUNDER,
TRENTON, - - N. J.
Chilled Cast Wire Dies
A SPECIALTY.
Any Size or Style Made at Short Notice.



J. MORGAN SPRING CO.



ESTABLISHED 1845

DUNBAR BROTHERS

MANUFACTURERS OF

STEEL OIL TEMPERED SPRINGS

ALL KINDS OF

SMALL SPRINGS

MADE FROM

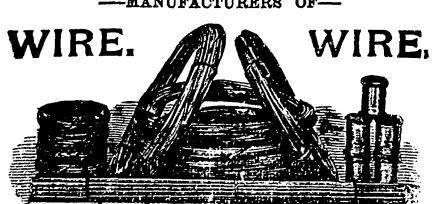
SHEET STEEL & STEEL & BRASS WIRE

BRISTOL, CONN.

WIRE MCHNY. **MORCAN CONSTRUCTION CO.,** WORCESTER, MASS.

ROLLING MILLS

GEO. W. PRENTISS & CO.
HOLYOKE, MASS.,
—MANUFACTURERS OF—
WIRE  **WIRE**



Bright, Coppered, Annealed and Tin Plated.
Finished to order, round, square, oval or flat.
WIMMER WIRE OF ALL SIZES A SPECIALTY

TINNED WIRE OF ALL SIZES A SPECIALTY

SYRACUSE SMELTING WORKS,
—MANUFACTURERS OF—
Highest Grades Anti-Friction Metals
FOR ALL MACHINERY BEARINGS.

Dealers in Block Tin,
Lead, Antimony, Alu-
minum, Phosphor Tin,
Copper and Brass Ingots,
Refined Spelter.



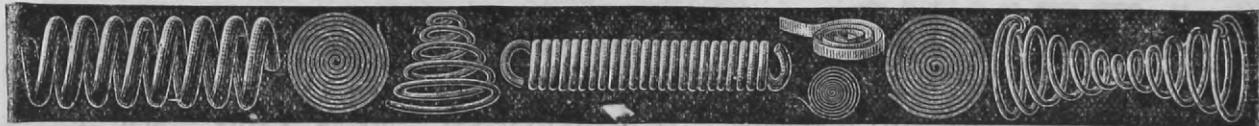
Also several grades of
Solder, Stereotype and
Needle Metals.

Spelter.
All Kinds of Brass, Bronze and Babbitt Castings made on short notice.
OFFICE AND WORKS:

243 & 245 West Onondaga St., Syracuse, New York.
All metals manufactured by us are warranted to be as represented. Give us a trial and you will use no other



117th to 118th Street and Harlem River. General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Lock, Hat, Brush, Saw, Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c. Piano, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Braided and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Slit soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

SUPERIOR STEEL COMPANY, PITTSBURG, PA.

—MANUFACTURERS OF—

HOT
and

COLD ROLLED STEEL,

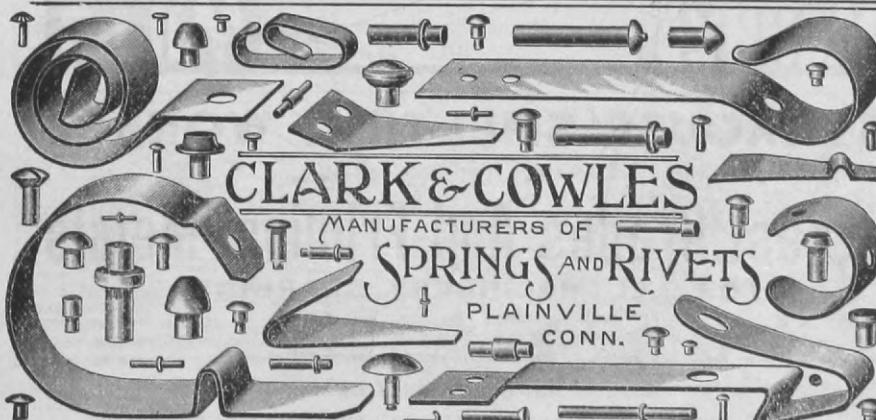
IN WIDTHS UP TO 10 INCHES, AND IN EXACT THICKNESSES FROM .0025 INCH TO $\frac{3}{4}$ INCH IN BESSEMER, OPEN HEARTH, SWEDISH, AND IN NICKEL AND CRUCIBLE CAST STEEL OF ALL DESCRIPTIONS, FOR SEWING MACHINE, BICYCLE AND TYPEWRITER PARTS, KEYS, CHAINS, CUPS, BELLS, KNOBS, FERRULES, AND HIGHEST GRADES OF SPRING STEEL FOR PENS, CLOCK SPRINGS AND WATCH MAINSPRINGS.

AGENCIES:

ELY & WILLIAMS,
No. 38 Park Row, New York.

No. 1239 Market St., Philadelphia.

SAMUEL T. ROWLEY,
No. 1030 Monadnock Building, Chicago.



VOLUTE,
WIRE
and
FLAT STEEL.

SPRINGS

FOR Agricultural Implements, Machinery and various other purposes.
Write for prices to
SABIN MACHINE CO.,
MANUFACTURERS.
MONTPELIER, VT.

VADE MECUM.

A work of reference for the use of Architects, Architectural Iron Workers, Builders, Blacksmiths, Bookkeepers, Boiler Makers, Contractors, Civil, Mechanical, Hydraulic, Mining, Stationary, Marine and Locomotive Engineers, Foremen of Machine Shops, Firemen, Master Mechanics of Railroads, Master Car Builders, Machine Shop Proprietors, Machinery Jobbers, Machinery Salesmen, Machinists, Pattern Makers, Railway Superintendents, Railway Supply Agents, Road-masters, Superintendents of Factories and Business Men generally.

Compiled and Arranged by

D. B. DIXON,

And with a most exhaustive Electrical Department by
THOS. G. GRIER,
A Prominent Specialist.

480 Pages, $8\frac{1}{2} \times 5\frac{1}{4}$ inches, Cloth, \$2.50.

Sent postpaid on receipt of price by
DAVID WILLIAMS, Publisher and Bookseller,
96-102 Reade Street, New York.

Always
Ask
For



Unequaled for Strength
and Durability.

Made Only by

Broderick & Bascom Rope Co.,
St. Louis, Mo.

**HOWSON
AND
HOWSON**

Counsellors at Law
Solicitors of Patents

PHILADELPHIA
Forrest Building, 119 S. 4th St.
NEW YORK
Potter Building, 38 Park Row.
WASHINGTON
Atlantic Building, 928 F St.

PATENTS

U. S. and Foreign Secured.

Trade Marks and Copy Rights. Twenty Years' Experience. Send model or sketch and brief description of your invention for Free report as to patentability. Expert searches and opinions as to Scope, Validity and Infringement. Patent Causes Prosecuted and Defended. Practice in U. S. Supreme, Circuit and Circuit Appeals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents." Free.
PATENT PRACTICE EXCLUSIVELY.
References Furnished on Application.
E. B. STOCKING, Attorney at Law,
611 F ST., N. W., WASHINGTON, D. C.

CHARLES N. BUTLER, C.E.
ATTORNEY IN PATENT CASES

611 Mutual Life Building, PHILADELPHIA, PA.
Tenth and Chestnut Sts.,

Formerly of the Examining Corps,
U. S. Patent Office.

PATENTS.
H. W. T. JENNER, Patent Attorney and Mechanical Expert, 608 F St., Washington, D. C. Charges moderate. Write for terms.
Established 1883.

W. S. ESTEY,
No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

WIRE CLOTH

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.,

—AND—

WIRE WORK

For Bank, Office and Counter Railing, Store Fronts, Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T SAND SCREENS.

SEND FOR CATALOGUE.

The Prospector's Field-Book and Guide in the Search for and the Easy Determination of Ores and other Useful Minerals. By Prof. H. S. OSBORN, LL.D. EXTRACT FROM THE PREFACE: In the following pages we have attempted to present such a view of the whole subject of prospecting for the useful minerals that any liberally educated reader may fully comprehend our meaning. We have therefore explained special terms where we have thought it convenient to use them, and where the technically educated student would not need an explanation. The table of contents and index have both been carefully prepared, and being very full, will make reference to any subject in the volume easy and satisfactory. 44 engravings. 175 pages \$1.50

For sale by David Williams, 86-102 Reade St., N. Y.

A. LESCHEN & SONS' ROPE CO.,
MANUFACTURERS OF



ST. LOUIS, MO.

All genuine Hercules Wire Rope is made with a red strand.

WIRE ROPE
HAZARD MFG CO.

WAREROOMS: 87 Liberty St., New York. WORKS: Wilkesbarre, Pa.

NEW HAVEN WIRE MFG. CO.,

Manufacturers of **WIRE** in great variety
NEW HAVEN, CONN.

THE STEWART WIRE COMPANY,

Office and Works,
EASTON, PENNA.

ANNEALED
BRIGHT
COPPERED
RIVET

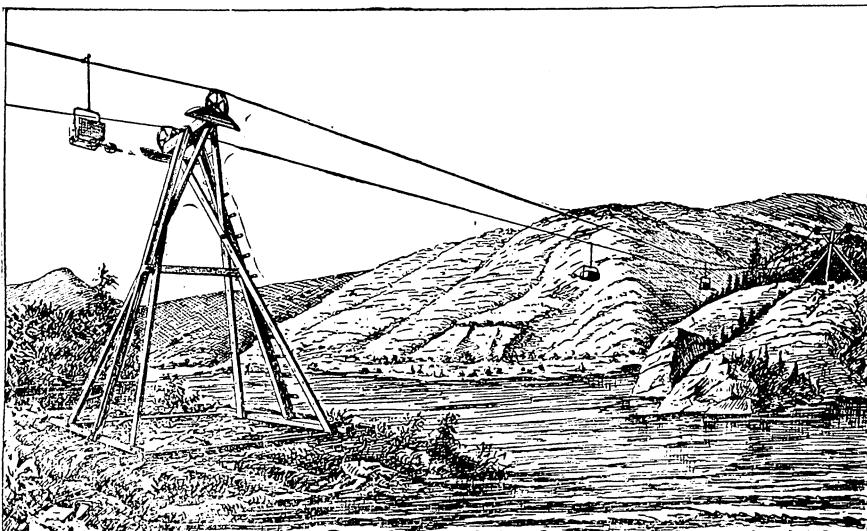
ALL SIZES
WIRE
ALL VARIETIES

LIQUOR
BRIGHT
SPRING
SCREW

New York Sales Office, 239 Broadway. Wire Straightened and Cut to Specified Lengths.

CALIFORNIA WIRE WORKS,

509-511 Market St., San Francisco, Cal.



MANUFACTURERS OF

WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.

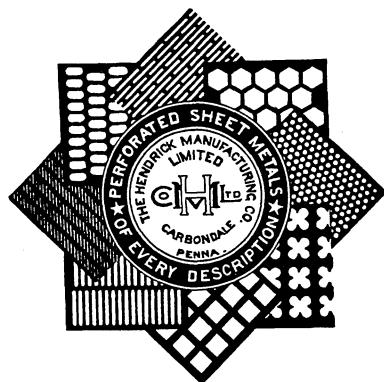
HALLIDIE'S PATENT WIRE ROPEWAY,

Simplicity and most economical means of transportation. Send for Illustrated Catalogue.

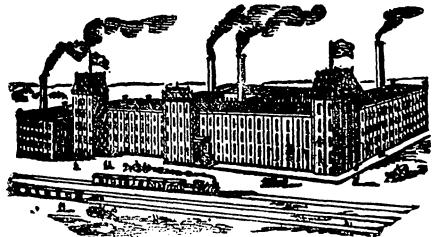
HOWARD & MORSE
45 FULTON ST.,
NEW YORK.
HEAVY MINING
COPPER,
BRASS,
STEEL
OR IRON
WIRE CLOTH.

ALSO
 MANUFACTURERS OF
 GENERAL
 WIRE WORK.
 Window Guards,
 Stable Fixtures,
 RAILINGS,
 Sand Screens
 Coal Screens
 Etc.

PERFORATED SHEET METALS
OF EVERY DESCRIPTION.



THE HENDRICK MFG. CO., LTD.,
CARBONDALE, PA.

WICK WIRE BROTHERS, CORTLAND, N. Y.
 MANUFACTURERS OF
 Wire Cloth and Wire Goods,

 Coal Sieves,
 Flour Sieves,
 Corn Poppers,
 Dish Covers,
 Metallic
 Coal Sieves.

NEW PROCESS
Cortland
 POWER LOOM
 WIRE CLOTH.
 Every roll wrapped in Pink
 Paper and has our name on
 label.



Write for Prices.
INDIANA WIRE FENCE CO.,
 Crawfordsville, Ind.

Kilmer Manufacturing Co.

Manufacturers of

BALE TIES

Newburgh, N. Y.

For Baling
 Hay, Straw,
 Rags,
 Excelsior, &c.

ALSO WIRE RODS, BARB WIRE, COILED STEEL WIRE, WIRE STAPLES, GALVANIZED WIRE, ORNAMENTAL FENCING, &c., &c.

Western Warehouse, 543 and 545 State Street, Chicago, Ill.
 Western Office, 21 Quincy Street, Chicago, Ill.
 New York Office, 111 Water Street, New York City.
 Works and General Office, Newburgh, N. Y.

CHAMPION IRON CO.

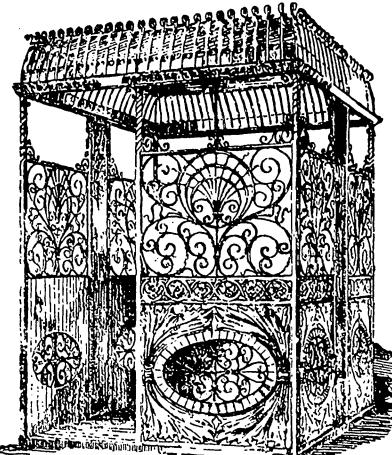


SPECIALTIES.

Iron Stairs and Jail
 Work, Builders' and Ornamental Iron Work
 and the only manufacturers of Malleable Iron
 Cresting guaranteed against breakage; also
 manufacturers of the
 Celebrated Ohio Champion Iron Force and
 Lift Pumps.

Send for 166-page Catalogue.
 Largest Iron Fence and Railing Works in U. S.

KENTON. - OHIO.



Elevator Enclosures.

Brass Wire and Iron Railings in plain or fancy designs.

Wire and Wrought Iron Fences and Window Guards.

WRITE FOR CATALOGUE.

LUDLOW-SAYLOR WIRE CO.

1114 & 1116 South 4th St., St. Louis, Mo.

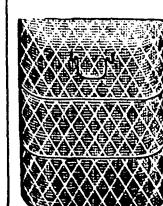


FLOWER POT STANDS.

Do you handle them?
 It will pay you to send for catalogue.

WIRE and IRON WORK
 of every description.

E. T. BARNUM,
 Detroit, Mich.



WE are the largest mfrs. of lined SPARK GUARDS

In the U. S. Write for prices.

Dow Wire Works Co.,
 Louisville, Ky.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio.

Office and Salesroom, 157½ Euclid Ave.,

MANUFACTURERS OF

WROUGHT IRON FENCE and RAILING.

Stable Fixtures, Crestings, Terminals, Wire Office and Counter Railing, Lawn Seats and Vases.

Iron and Steel Jail Cell Work. Ornamental and Structural Ironwork.



CLINTON WIRE CLOTH CO.,

Manufacturers of Every Description of

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

Perforated Metals.

GALVANIZERS
AND TINNERS OF

Wire Cloth and Nettings.

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street.

The Gilbert & Bennett Mfg. Co.

MANUFACTURE

Pearl Window Screen Wire Cloth.
Galvanized Steel Wire Cloth.
Galvanized Wire Poultry Netting.
"Cottage" Lawn & Garden Fencing.
"C. & B." Web Wire Fencing.
Sieves, Riddles, Screens.
Gilbert's Rival Ash Sifters.
House Furnishing Wire Goods.

WIRE CLOTH, NETTING,
Fencing, Gates, Fencing Tools,

Wire Goods, Wire Work

Stable Fixtures, Railings, Window Guards.
WIRE LATHING WITH HAMMOND'S METAL FURRING.

44 Cliff Street,
NEW YORK.

148 Lake Street,
CHICAGO.

Factories, { GEORGETOWN, CONN.
CHICAGO, ILLINOIS.

ESTABLISHED 1818.

WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mass.



PATENTED 1884
NEW PROCESS

NEW PROCESS MANUFACTURERS OF EVERY DESCRIPTION OF
HARD STEEL WIRE CLOTH AND NETTING

GALVANIZED
WIRE NETTING.

Patented March, 1884.
Patents Pending.

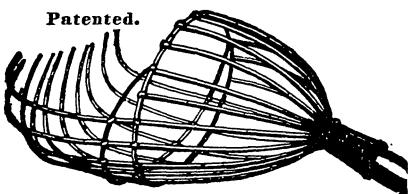
Painted Window Screen Wire Cloth,

WIRE LATHING, HOUSE FURNISHING WIRE GOODS.

SEND FOR LATEST CATALOGUE.

"PENNSYLVANIA" FRUIT PICKER.

Patented.



This Cut almost speaks for itself—the device being so much like the human hand shows at once the utility of the article.

AS A FRUIT PICKER IT HAS NO SUPERIOR.

It is made of Heavy Galvanized Wire, and Easily Adjusted to a Pole. It has been sold for several years, and the demand (as it is becoming known) is steadily increasing.

The difficulty of detaching fruit and securing it unbruised is apparent to everyone so engaged. This overcomes the difficulty, and saves the finest fruit, which commands the highest prices.

THE LOW PRICE AT WHICH IT IS SOLD.

brings it within the reach of those who have but little fruit to gather as well as those who have large quantities.

Price, per dozen, \$6.00. Liberal discount to dealers. It will gather Apples, Peaches, Pears, etc.

Manufactured by **Pennsylvania Wire Works,**

EDWARD DARBY & SONS, 233 & 235 Arch St., Philadelphia, Pa.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH.

MANUFACTURERS

**THE ROEBLING
STANDARD
WIRE
LATHING.**

WENTON, 117 and 119 LIBERTY STREET,
NEW JERSEY.

NEW YORK.

171 and 173 LAKE STREET,
CHICAGO.

25 and 27 FREMONT STREET,
SAN FRANCISCO.

• NEW JERSEY •
WIRE CLOTH CO.

"JERSEY"
POULTRY
NETTING
AND FARM
FENCING.

A large per cent. of the Nail Mills, Horse Shoe
Concerns and Bolt and Nut Works
are using our

Patent 2 Stave

KEGS

Furnished in knock-down or ready for use.
Crescent Manufacturing Company,
DETROIT, MICH.

SCHEELER & SONS,

MANUFACTURERS OF

Wire Cloth and
Wire Goods,

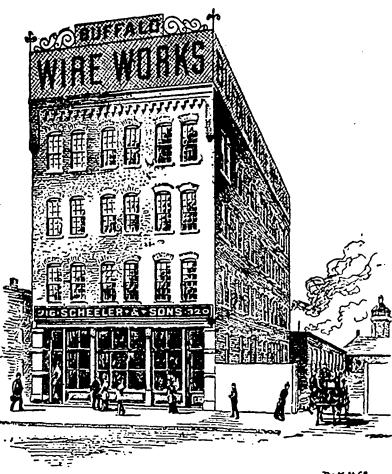
ARTISTIC

METAL WORK, ETC.

316, 318, 320 Terrace, near Genesee,

61, 63, 65 Jackson Street,

Buffalo, N. Y.



Standard Books

—ON—

FOUNDRY PRACTICE.

The Iron Founder.

A comprehensive treatise on the art of molding, including chapters on core-making, loam, dry sand and green sand molding, also crystallization, shrinkage and contraction of cast iron and a full explanation of the science of pressures in molds, added to which are formulas for mixtures of iron, tables, rules and miscellaneous information. By SIMPSON BOLLAND. Illustrated with over 300 engravings. 12mo, cloth.... \$2.50

The Iron Founder Supplement.

A complete illustrated exposition of the art of casting in iron, comprising the erection and management of cupolas, reverberatory furnaces, blowers, dams, ladles, etc., mixing cast iron, founding of chilled car wheels, malleable iron castings, foundry equipments and appliances, gear molding machines, molding machines, burning, chilling, softening, annealing, pouring and feeding, foundry materials, advanced molding, measurement of castings, wrought iron, steel, etc. Also the founding of statues, the art of taking casts, pattern modeling, useful formulas and tables. By SIMPSON BOLLAND. Illustrated with over 200 engravings; 400 pages; 12mo: cloth..... \$2.50

The Encyclopedia of Founding and Dictionary of Foundry Terms.

used in the practice of molding. Together with a description of the tools, mechanical appliances, materials, and methods employed to produce castings in all the useful metals and their alloys, including brass, bronze, steel, bell, iron and type founding, with many original mixtures of recognized value in the mechanic arts. Also aluminum, plating, gilding, silvering, dipping, lacquering, staining, bronzing, tinning, galvanizing, britannia ware, German silver, nickel, soldering, brazing, ores, smelting, refining, assaying, etc. By SIMPSON BOLLAND. 12mo: cloth..... \$3.00

Modern Molding and Pattern Making.

A practical treatise upon pattern shop and foundry work. By JOSEPH P. MULLIN, M.E.: 257 pages; cloth; illustrated..... \$2.50

Iron and Steel Founding.

Illustrated with 39 diagrams. By C. WYLIE. Second edition, revised and enlarged: 324 pages; 8vo; cloth..... \$2

The Practical Brass and Iron Founder's Guide.

A treatise on brass founding, molding, the metals and their alloys, etc. By JAMES LARKIN, late conductor of the brass foundry department in the Penn Works, Philadelphia. A new revised and greatly enlarged edition. Contents: Among the most important and entirely new sections of this edition of this valuable and popular book are the following: Behavior of Metals and Alloys in Melting and Congealing; Malleable Iron Castings; Wrought Iron or Mitis Castings; Manufacture of Steel Castings; Casting of Brass; Casting of Bronze; Bell Founding; Chill Casting; Casting without Core; Casting on to Other Metals; Casting Iron and Other Metals Upon Lace, Emroideries, Fern Leaves and Other Combustible Materials; Some Modern Bronzes. In one volume; 12mo; 400 pages..... \$2.50

American Foundry Practice.

Treating of loam, dry sand and green sand molding, and containing a practical treatise upon the management of cupolas and the melting of iron. By THOMAS D. WEST, practical iron molder and foundry foreman. Fully illustrated. Eighth edition. 408 pages; cloth..... \$2.50

Molder's Text Book,

being Part II of American Foundry Practice. A practical treatise on molding, discussing the question of economy in casting and the arrangement of a foundry in regard to rapid work. Treating of cupolas, methods of firing, best means of securing perfect and sound castings, &c., being a continuation of Vol. I on this subject, and dealing with a class of work requiring more skill and greater care. By THOMAS D. WEST. With numerous illustrations. Fifth edition. 461 pages; cloth..... \$2.50

Sent, Postpaid, on receipt of price, by

DAVID WILLIAMS,

Bookseller and Publisher,

96-102 Reade St., -

THE CELEBRATED

"SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST.

Perforated Filter
Press Plates.



BRONZE SCREEN PLATES
To withstand action of
ACIDULATED WATERS.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

GRAIN CLEANING AND MINING MACHINERY,
WOOLEN, COTTON, PAPER AND PULP MILLS,
RICE, FLOUR AND COTTON SEED OIL MILLS,
SUGAR AND MALT HOUSES,
DISTILLERIES, FILTER PRESSES,

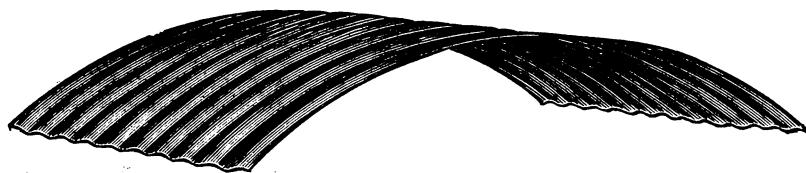
FOR USE IN
STONE, COAL AND ORE SCREENS,
BRICK AND TILE WORKS, FILTERS,
SPARK ARRESTERS, GAS AND WATER WORKS,
OIL, GAS AND VAPOR STOVES,
COFFEE MACHINERY, ETC., ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

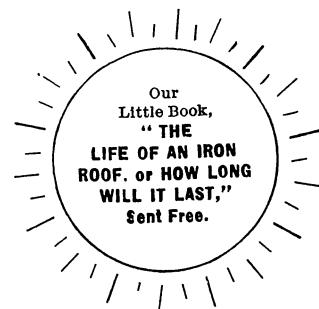
Main Office and Works, 222 to 240 N. Union St., Chicago, Ill., U. S. A. Eastern Office, No. 284 Pearl St., New York.

Curved Roofing
Sheets. *

Made of Iron or Steel.
We give special attention
to exactness in this kind
of work and have a large
patronage from the leading Arch.
Iron Works, Bridge Works, Builders
and Contractors.



The Cincinnati Corrugating Co.,
Box 312, Piqua, Ohio.



Our
Little Book,
"THE
LIFE OF AN IRON
ROOF, or HOW LONG
WILL IT LAST,"
Sent Free.

The New York Iron Roofing and Corrugating Co.
Finest and Largest Variety of FIRST & WASHINGTON STS. JERSEY CITY, N.J.
Sheet Metals. Products manufactured in the U.S.

COBB & DREW,

PLYMOUTH, MASS.

Manufacturers of Norway Iron Rivets, Brass
and Copper Rivets, Burrs, Washers,
D. P. Tacks and Staples.

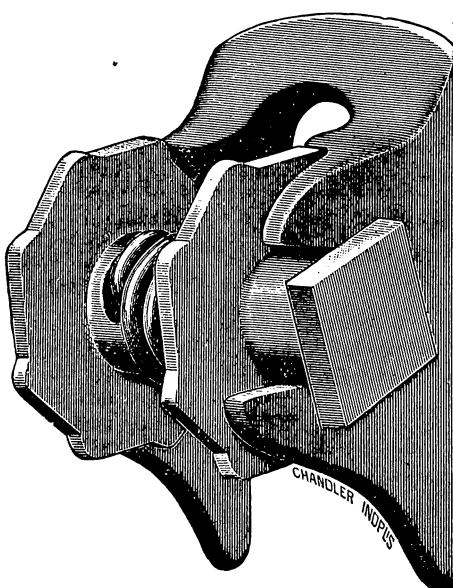
New York Agency, James S. Henderson,
successor to Disosway &
Henderson, Hardware.

Agents for Philadelphia Star Carriage
and Tire Bolts.

Corrugated, and all Other Shapes of Iron
Roofing and Siding.



Iron Buildings, Roofs, Doors, Shutters, Cornices,
Skylights, Bridges, &c.
MOSELEY IRON BRIDGE AND ROOF CO.,
Office 5 Dey Street, Room 18, NEW YORK.



LOYAL
LOCK
Ratchets.

Patented March 24, 1891.

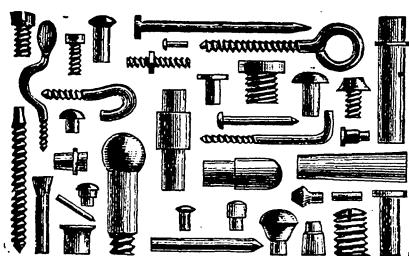
A Perfect Wire Tightener.

A Simple Tension Adjuster.

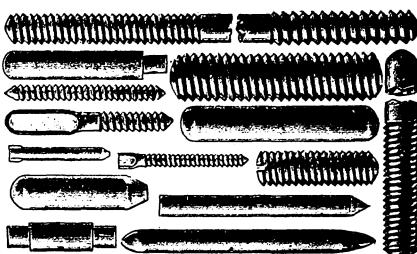
Holds any wire and will not loosen.

Saves Posts and Time in
Fence Building. 1,000,000 in
use. Is Unexcelled. In kegs
of 100. Large Profits.

WIRE FENCE SUPPLY CO.,
329 MASS. AVE., INDIANAPOLIS, IND.



**IRON and BRASS RIVETS,
STUDS, PINS, SCREWS, &c.,**
For Manufacturers of Light Hardware.
Blake & Johnson
WATERBURY, CONN.



NEW CASTLE WIRE NAIL CO., MANUFACTURERS OF **STEEL WIRE NAILS.**

WIRE RODS AND WIRE.

Office and Works,

NEW CASTLE, PA.

CINCINNATI BARBED WIRE FENCE COMPANY,

MANUFACTURERS OF

**BARBED
ANNEALED
GALVANIZED
BALING**

WIRE

**NAILS,
GOODS,
STAPLES,
BALE TIES.**

CINCINNATI, OHIO.



THE SALEM WIRE NAIL CO.

—MANUFACTURERS OF—

**STEEL WIRE NAILS, FENCE STAPLES,
ANNEALED and GALVANIZED WIRE.**

Works: SALEM, O.; FINDLAY, O.

General Office: — SALEM, OHIO.

BRANCH OFFICES:

Room 32, 277 Broadway, New York.

415 Phenix Bldg., Chicago.

200 Amer. Central Bldg., St. Louis.

19-20 Ainsworth Block, Portland, Ore.

38 Pickering Bldg., Cincinnati, O.

Osgood & Howell, 132 Market St., San Francisco, Cal.

THE BOND NAIL.



These nails are made from different sizes of wire with head at any desired position between the points. For coopers, box and furniture manufacturers' dowels, they are unsurpassed. Builders and repairers of all kinds will find these nails useful. We also manufacture Doweling Machines and Sets for driving these nails. Address

THE BOND NAIL CO.,

P. O. Box 28, RAYNHAM, MASS.



205 Quarry St., Philadelphia.



ONE GROSS BOX,

Containing a full assortment of CARPET TACKS, made in polished, blue and tinned.

PUT UP IN SALABLE FORM.



A Complete Line.

No Dead Stock.

No Large Investment.

SEND FOR PRICE.

Duplicating Samples a Specialty.

CRIMPED
STEEL
WIRE

LAWN FENCES

TREE GUARDS and SETTEES, CHEAPER THAN WOOD.
McCALLIP FENCE AND WIRE WORKS, Columbus, Ohio.

BORDEN & LOVELL,
70 AND 71 WEST STREET
NEW YORK.

Steel, Iron and Wire Nails.

ATLAS TACK CORPORATION.**508 SEARS BUILDING, BOSTON, MASS., U. S. A.**

DUNBAR, HOBART & CO., WHITMAN, MASS.

LORING & PARKS, PLYMOUTH, MASS.

ESTABLISHED IN 1810. CONSOLIDATED 1891.

ESTABLISHED IN 1842.

A. FIELD & SONS, TAUNTON, MASS.

TAUNTON TACK CO., TAUNTON, MASS.

ESTABLISHED IN 1827.

ESTABLISHED IN 1854.

AMERICAN TACK CO., FAIRHAVEN, MASS.

OLD COLONY RIVET CO., PLYMOUTH, MASS.

ESTABLISHED IN 1867.

ESTABLISHED IN 1866.

MANUFACTURERS OF

Tacks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungarian Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Escutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well-known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York Store and our factories.

MAIN OFFICE, 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.**BRANCH OFFICE & WAREHOUSE, 81 WARREN ST., NEW YORK.****BRANCH OFFICE & WAREHOUSE, 193 LAKE ST., CHICAGO, ILL.****BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.****BRANCH OFFICE & WAREHOUSE, 339 MARKET ST., PHILADELPHIA, PA.****BRANCH OFFICE & WAREHOUSE, 14 WEST GERMAN ST., BALTIMORE, MD.****GRAND CROSSING TACK CO.,****GRAND CROSSING, CHICAGO, ILL., U. S. A.**

Tacks and Small Nails, Wire Nails and Brads, Double Pointed Tacks and Staples, Lining and Saddle Nails, Slating and Roofing Nails, Brass and Iron Shoe Nails and Specialties.

NOVELTY 5c. SELLERS.

CHAMPION WOOD KEGS.

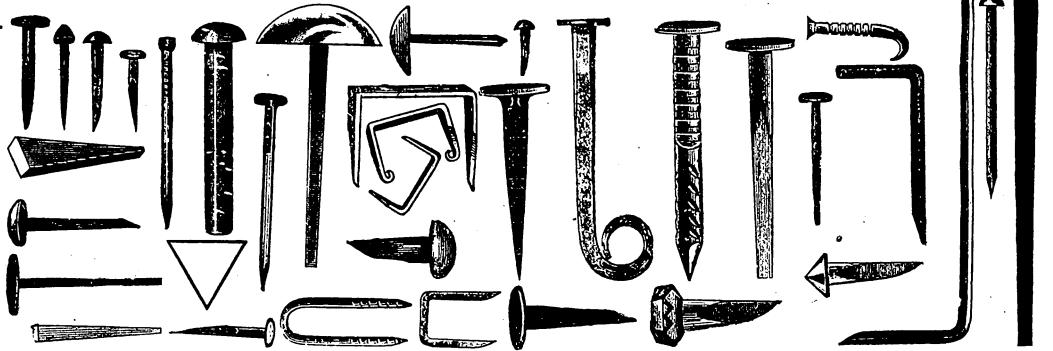
CLAW HANDLES.

TACKS, FT. DEARBORN.
(34 lb. pa.)
BONNIE BLUE.

PARISIAN GILT.

NAILS. JUST ENOUGH.
(Brass.)
DOUBLE ENOUGH.
(Iron.)

BRADS. BILL NYE BOX.

New York Office,
84 WEST BROADWAY.**E. H. Titchener & Co.****BINGHAMTON, N. Y.**

—MANUFACTURERS OF—

**STAPLES in All Varieties:**

Double-Pointed Tacks, Bed Links, Etc.

New York City Agents, HARMON & DIXON
118 Chambers Street.**IMPROVED****Tack, Shoe and Wire Nail
MACHINERY.****KIMBAL BROS. & CO., Mfgs.,
BROCKTON, MASS.**

Send for Prices.

TACK AND NAIL**Machinery.****BEST AND LARGEST ASSORTMENT.****Wm. A. Sweetser, Brockton, Mass.****THE****WIRE GOODS COMPANY****Worcester, Mass.**

Hardware and Kitchen Wire Goods. Specialties to order. Everything in Wire.

ZINC GLAZIERS' POINTS.

All Sizes Triangles and Sharps. Send for New Illustrated Price Sheet.

SHELTON CO., - Derby, Conn.**BRASS SHOE NAILS.****PRICES NO HIGHER. PROMPT SHIPMENTS.****CLENDENIN BROS., - BALTIMORE, MD.****The English and American Mechanic:****AN EVERY-DAY HAND-BOOK FOR THE WORKSHOP AND THE FACTORY.****CONTAINING**

Several Thousand Receipts, Rules and Tables Indispensable to the Mechanic, the Artisan and the Manufacturer.

By B. Frank Van Cleve.

A new, revised, enlarged and improved edition, edited by Emory Edwards, M.E.

ILLUSTRATED WITH EIGHTY-FIVE ENGRAVINGS.

In one volume, 500 pages, 12mo, closely printed, containing a vast body of information of value to all practical men. Elegantly bound in scarlet cloth, gilt. Price \$2.00.

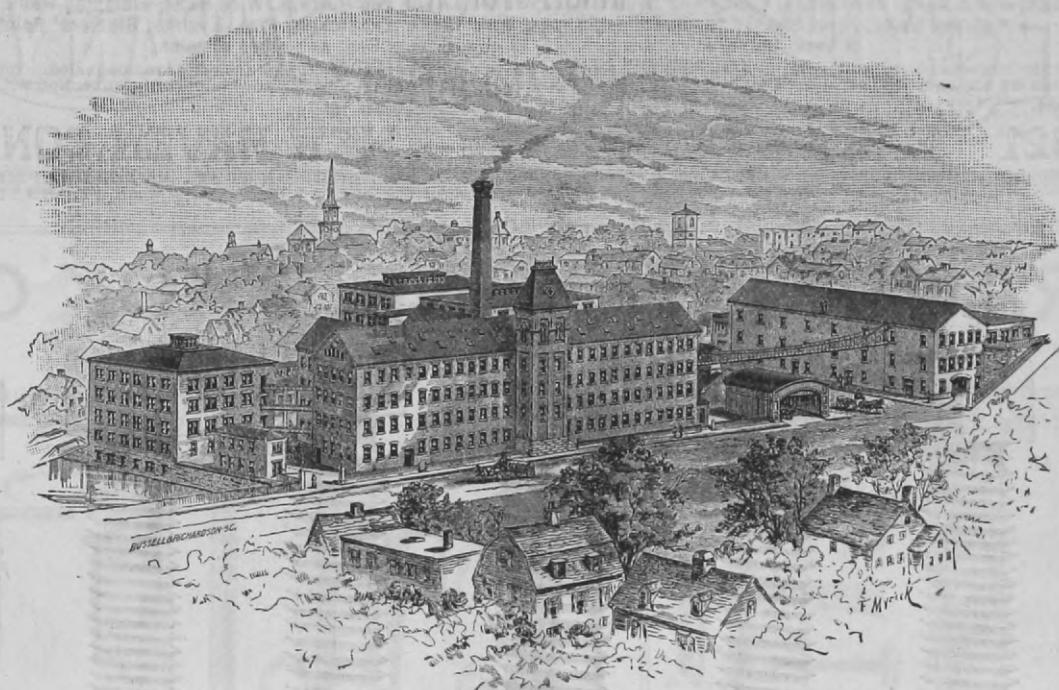
Any Book Published Sent, Post-paid, on Receipt of the Price, by

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street, New York.

American Screw Company,

PROVIDENCE, R. I.



BAY STATE MILLS, PROVIDENCE, RHODE ISLAND, U. S. A.

— MANUFACTURERS OF —

WOOD SCREWS,

In Iron, Brass, Bronze and all Varieties
of Finish.

COACH SCREWS,

MACHINE SCREWS,

RAILROAD SCREWS,

HAND RAIL SCREWS,

SIDE KNOB SCREWS,

LOCK CAP SCREWS,

DOWEL SCREWS,

CHANDELIER SCREWS,

RIVETS, BURS,

TIRE BOLTS,

STOVE BOLTS,

SLEIGH SHOE BOLTS,

SINK BOLTS,

STOVE RODS,

POINTED WIRES,

TAPPED NUTS,

WIRE NAILS,

DOWEL PINS,

TAPS FOR MACHINE SCREWS,

TAPS FOR STOVE BOLTS.

COLD
FORGED

Rogers Drive Screws,
Side Knob Screws,
Lock Cap Screws,
Machine Screws,
Stove Bolts,
Forged Wood Screws,
Threaded Wires,
Fluted Tire Bolts.

American Screw Company,

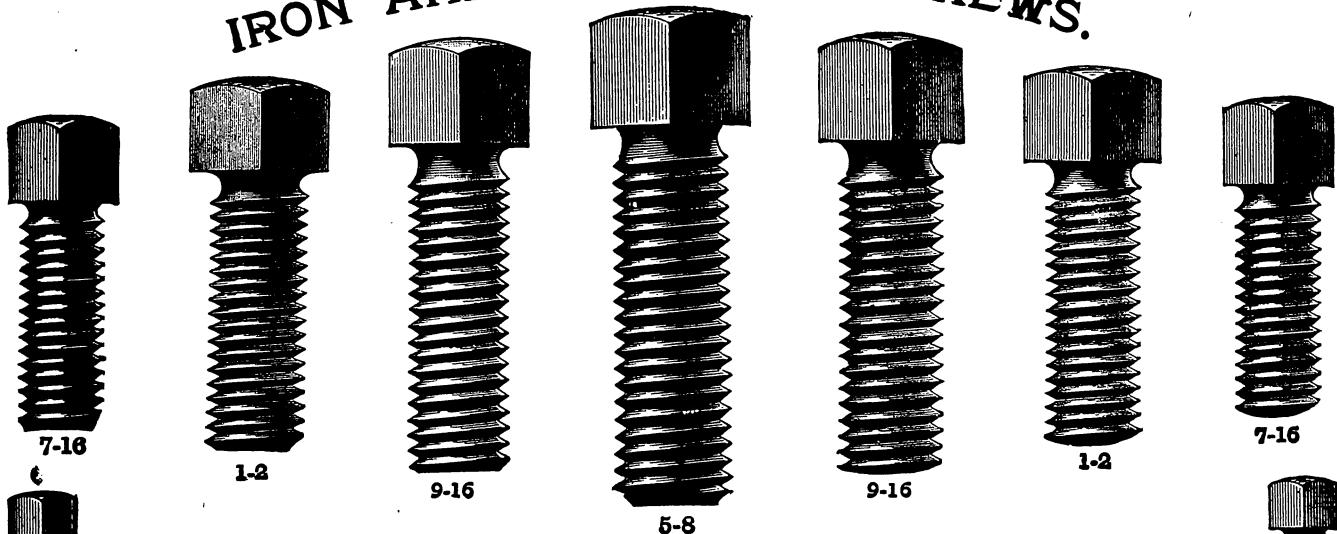
PROVIDENCE, R. I.

Chicago Store, No. 19 Lake St.

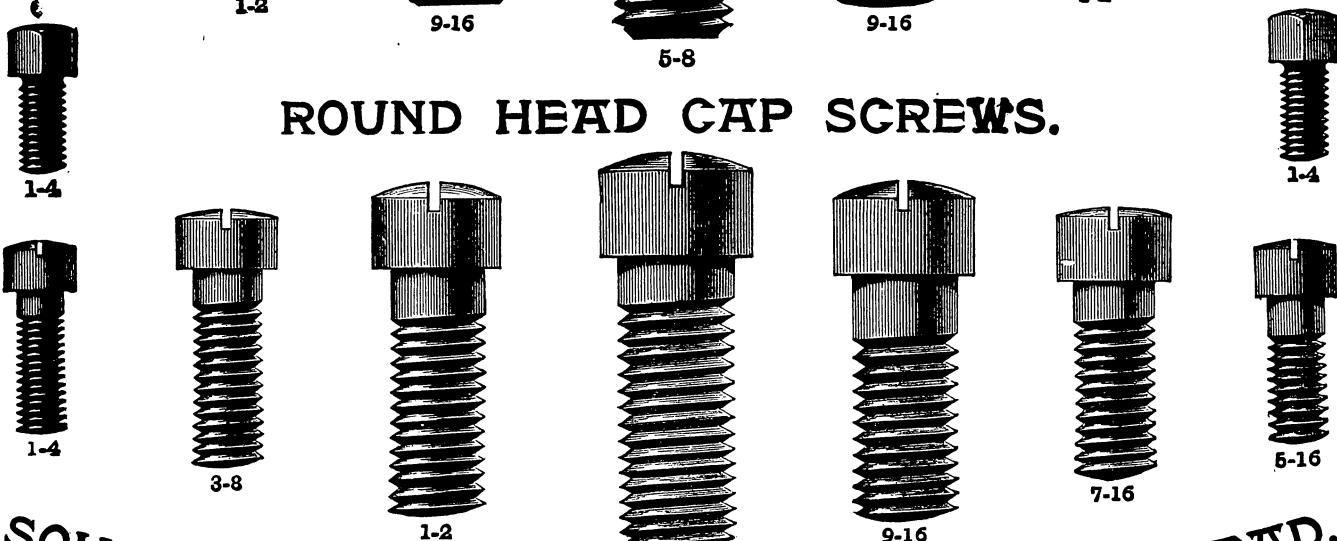
EUROPEAN AGENTS, THOMAS & STIRLING, Liverpool



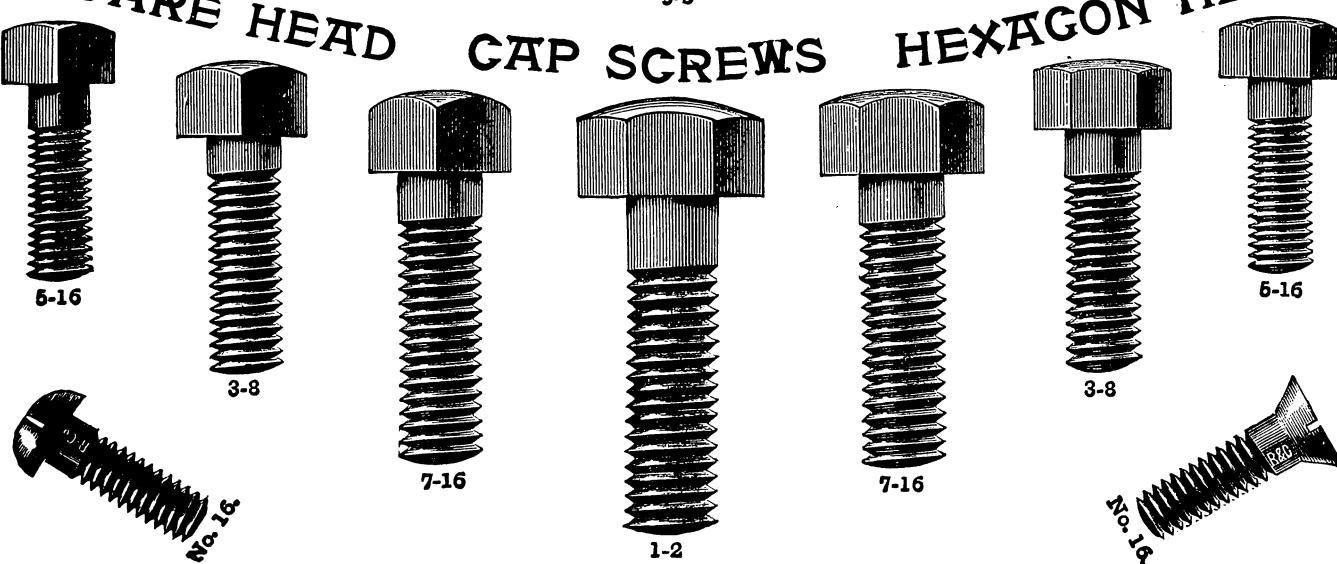
IRON AND STEEL SET SCREWS.



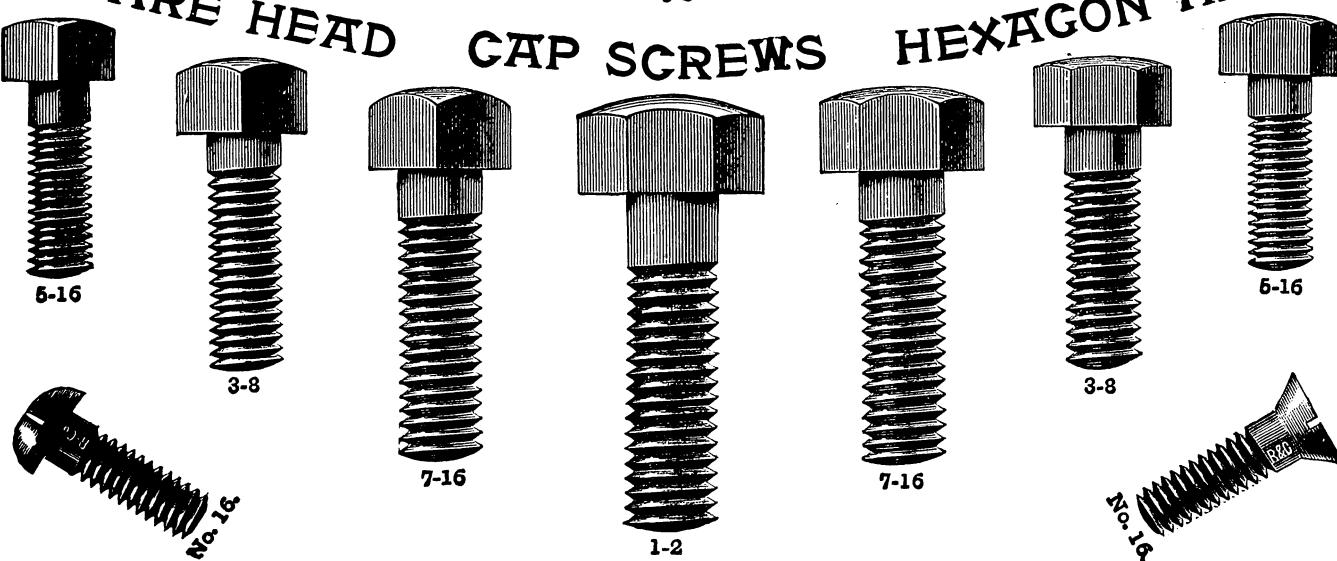
ROUND HEAD CAP SCREWS.



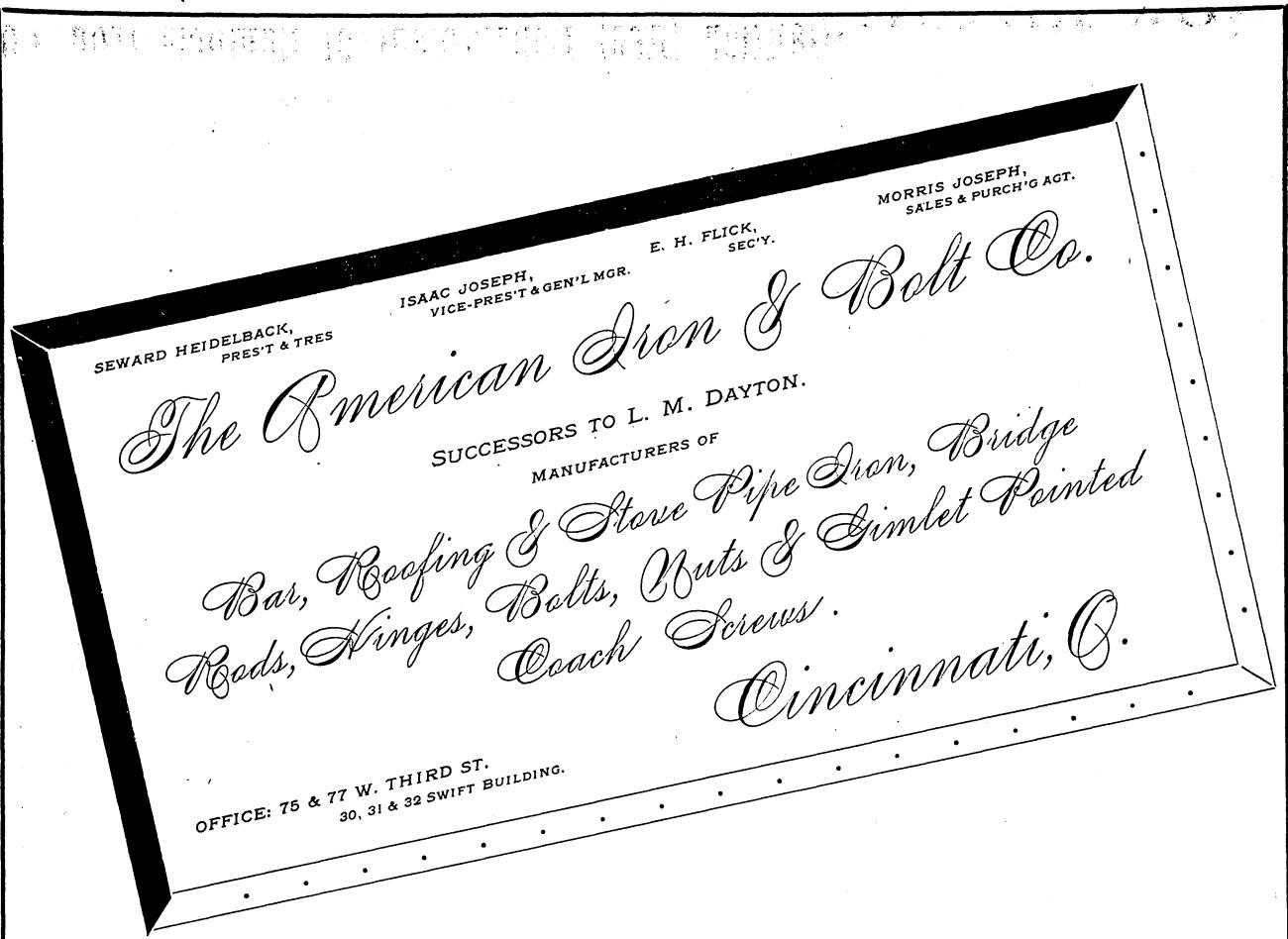
SQUARE HEAD CAP SCREWS



HEXAGON HEAD.



SEND FOR CATALOGUE.



Announcement!

We beg to inform the trade that our mills and factories are now in full operation and that we are prepared to fill all orders for goods mentioned above in any quantities desired. Our line of Bolts, Bridge Rods, Nuts, etc., consists of the most varied assortment in both shapes and sizes manufactured from the best material, and we are prepared to submit exceptionally advantageous propositions to intending purchasers. We would be pleased to receive your specifications and submit quotations.

Respectfully.

The American Iron & Bolt Co.

NOW READY.

HENDRICKS'
Architects and
Builders' Guide
—AND—
Contractors' Directory
OF AMERICA
FOR
Builders, Contractors, Manufacturers
AND DEALERS IN ALL KINDS OF
BUILDING - SUPPLIES.

A Complete Directory of all the Construction Industries of the Country, Containing over 180,000 Names, Addresses and Business Classifications, comprising Builders and Contractors of Material and Construction in the Building and kindred Industries. With Full lists of the Manufacturers of and Dealers in Everything employed in the Manufacture of Material and Apparatus used in these Industries—from the Raw Material to the Manufactured Article, and from the Producer to the Consumer.

Architects; Arch'l Wood Workers; Car Builders; Carpenters; Builders and Contractors of all kinds; Blast Furnaces; Brick Mfrs. (Common, Fire, Ornamental, Paving, Pressed, &c.) Boiler Mfrs.; Bridge Builders; Builders' Hardware; Mfrs. of Building Iron of all kinds; Cement; Cornices; Dumb Waiters; Engine Mfrs.; Engine and Boiler Dealers; Electric Lighting Co.'s Dynamos and Motors; Elevators; Engineers (Civil and Mechanical); Electricians; Fire Escapes; Furnaces; Fire Proof Building Material; Dredging Machinery and Contractors; Dock Builders; Contractors for Railroads (Steam, Electric, Elevated, Cable, Street, &c.); Granite Producers, Dealers and Workers; Granite and Marble Monument Workers and Dealers; Iron and Steel Ceiling and Siding; Iron and Steel Roofing; Lathing (Iron, Steel and Wire); Lighting Rods; Mantel Mfrs. (Iron, Marble, Onyx, Slate, Wood, &c.); Mantels, Grates, Fenders, Tile, &c.; Marble Producers, Marble Dealers and Workers; Mason and Builders' Materials; Paint Mfrs.; Paint, Oil and Glass Dealers; Plumbers' Specialties; Plumbers, Gas and Steam Fitters; Plumbers', Gas and Steam Fitters' Supplies; Roofers and Roofers' Supplies; Steam Supplies (Gauges, Feed Water Heaters, Traps, Valves, Pipe and Boiler Coverings, Cast and Wrought Iron Pipe and Fittings); Steam and Hot Water Heating Apparatus; House Heating Boilers and Heaters; Steam and Hot Water Heating Contractors; Railroad Purchasing Officials; Radiators; Rolling Mills, &c.; Sashes, Doors and Blinds; Skylights; Stone Dealers; Terra Cotta; Varnishes; Ventilators; Vault and Sidewalk Lights; Weather Vanes; White Lead Mfrs.; Wire Mfrs. and Workers; in fact, everything connected with the Building Industries.

FOR THE YEARS 1894-95.

PRICE FIVE DOLLARS.

SENT, POST-PAID, ON RECEIPT OF PRICE BY

DAVID WILLIAMS,
 Publisher and Bookseller,
 96-102 Reade St., N. Y.

Gautier Steel Department of Cambria Iron Co.,**JOHNSTOWN, PA.**

—: MANUFACTURERS OF:—

MERCHANT BAR STEEL:

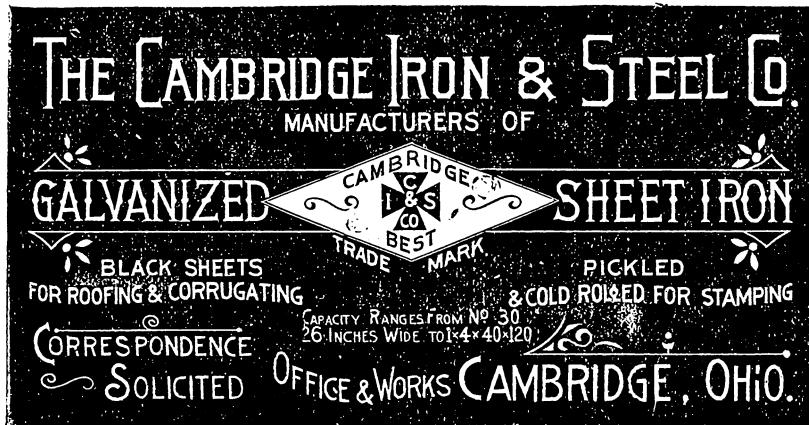
Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.

AGRICULTURAL STEEL AND SHAPES:

Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.

PLOW STEEL:

Flat and Finished Plow Shapes, Digger Blades, Slabs, (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

COLD ROLLED STEEL SHAFTING.**STEEL HARROW DISCS.****CAMBRIA LINK BARB WIRE.**New York Office,
102 Chambers St.Philadelphia Office,
S W. Cor. 5th & Commerce Sts.Chicago Office,
209 Phenix Building.Southern Office,
Chattanooga, Tenn.**STOVE PIPE.**

All sizes, Plain, Russia and Galvanized Iron. In 24 inch joints assorted diameters, nested and crated for shipment. Cheapest and best in the market.



Plain, Painted or Galvanized Corrugated Sheets.

SIDING, ROOFING, CEILING, &c. &c.

Galvanized and Plain Steel and Iron Sheets, Bars, Hoop and Band Iron, Nails, Spelter, Lead, Tin, &c. Galvanized Riveted Leader, cheapest and best in the market. Sheet Iron Piping and Fittings of every description.

GENERAL GALVANIZING TO ORDER.

**THE JERSEY CITY GALVANIZING CO., MANUFACTURERS AND JOBBERS IN
Galvanized Material of every description.**
Works, Jersey City. Store, 112 John St., New York.

**SECTIONAL PANEL
STEEL CEILINGS.****ELEGANCE**

The Superior Merits of our Steel Ceilings and Side Wall Plates are

DUST PROOF JOINTS.

Mouldings varying in depth from 11-16 inch to 2½ inches.

VARIETY INDEFINITE.

Sagendorph's Patent Sectional Steel Products Excel and Exceed all others combined. Ceilings and Side Walls Perfection Intact.

SOLE MANUFACTURERS,

THE PENN IRON ROOFING & CORRUGATING CO.
(LIMITED),

PHILADELPHIA, PA.

WE BEG TO CALL ATTENTION TO OUR “Structural Tubing”

(On which and on the machinery and process of manufacture there are patents pending in the United States and foreign countries).

This Tubing is not intended to convey liquids, but for construction purposes where rigidity, elasticity, strength and lightness are required is equal to machinery rounds, and tests have proven conclusively that it is stiffer, stronger and more serviceable than welded pipe.

It is manufactured in rounds from $\frac{3}{4}$ inch to 4 inches in diameter, and a large assortment of Squares, Channels and Triangles, which can be used to great advantage by manufacturers of

Agricultural Implements,

Wagons,

Wheelbarrows,

Fire Escapes,

Blowers,

Wind Mills,

Railway Signals,

Fences,

Hand Railings,

Light Iron Buildings,

Forges,

Brake Beams,

Tops and Masts for Electric Light and Trolley Poles,

Braces for Car Truck Frames, Bedstead Frames,

Railway and Steamship Railings, etc.

We will be glad to name prices and discounts and furnish samples for tests.

NATIONAL STRUCTURAL TUBING CO.,

Potter Building, New York.

SELLING AGENTS:

JUSTICE COX, Jr., 218 South Fourth Street, Philadelphia, Penna.

F. K. BOWES, No. 5 Exchange, Grand Pacific Hotel, Chicago, Ill.

THE HOLLAND CO., Hamilton Building, Pittsburgh, Penna.

TO MANUFACTURERS AND OTHERS.—We respectfully ask you not to be hasty in contracting for your season's supply of **inferior** material on account of misrepresentations of manufacturers thereof, in regard to our Structural Tubing, and our ability to make deliveries.

It is far beyond experiment, and is being made daily. Additional size or shape added to list weekly.

We invite thorough investigation.

With no prospect whatever of advance this winter in the price of iron or its products, you will lose nothing by delaying the little time necessary for full examination. Write us.

Lukens Iron AND Steel Co. INCORPORATED 1890.

The First to make Boiler Plates in America.
 Chas. Huston, Pres. A. F. Huston, Vice-Prest. C. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.

STEEL AND IRON PLATES, ALSO SHEETS

TO EXTREME DIMENSIONS. WIDTHS UP TO 10 FEET. THICKNESS, NO. 12 GAUGE TO 1½ INCHES.

—ESTABLISHED 1810.—

MAIN OFFICE & WORKS:
 Coatesville, Pa.

NEW YORK OFFICE:
 No. 29 Broadway.

PHILADELPHIA OFFICE:
 62 & 64 Bullitt Bldg.

FRANK SAMUEL,
 186-188 So. 4th St.,
 Philadelphia.

LOW PHOSPHORUS

THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

WROUGHT IRON AND OPEN HEARTH STEEL.

Beams, Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes,
 Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes.
 SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes,
 Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & CO., 29 Broadway, NEW YORK; EDWARD CORNING & CO., 70 Kilby St., BOSTON, MASS.; JAMES B. STOKES, 182 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 931 The Rookery, CHICAGO.

POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA.,

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET

MANUFACTURERS OF ALL KINDS OF

STRUCTURAL IRON AND STEEL,

Viz., I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

TESTED CHAINS.

BRADLEE & CO., - EMPIRE CHAIN WORKS,

Beach and Otis Streets, PHILADELPHIA.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains.

High Grade Tested Chains.

JAMES MCKAY & CO.,

29TH & LIBERTY STREETS,

PITTSBURGH, PA.

Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

BARCLAY W. COTTON & CO.,
 Successors to ESHERICK, COTTON & CO..

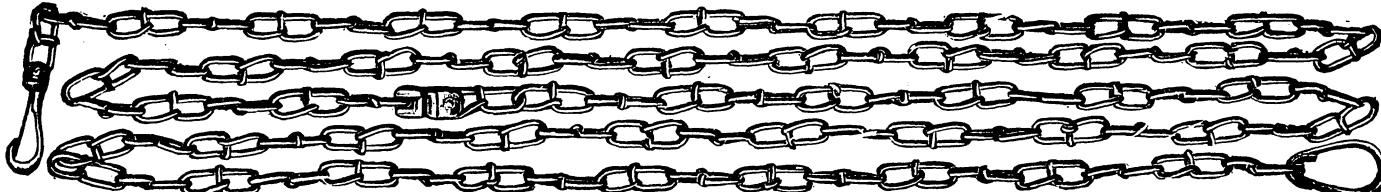
Iron and Steel Merchants.

AGENTS FOR

"Continental" Corrugated Furnaces.
 418 Walnut St., PHILA.

LIGHT, STRONG AND SUBSTANTIAL.

EUREKA WELDLESS TIE OUT OR LARIAT CHAINS for tethering cattle; with swivel every ten feet.



Manufactured by GARLAND CHAIN CO., Rankin, Pa.

EDWARD CORNING & CO.,

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS

BEAMS, CHANNELS,
 ANGLES, TEES, PLATES,
 RIVETED GIRDERS.

29 BROADWAY,
 NEW YORK.

IRON AND STEEL,

421 CHESTNUT ST.,

PHILADELPHIA.

OUR OFFICES AND MILLS ARE CONNECTED BY TELEPHONES.

BARS, BANDS, HOOPS,
 BOLTS, NUTS, RIVETS,
 ROOF TRUSSES.

70 KILBY ST.,
 BOSTON.

W. S. PILLING.

PILLING AND CRANE.

T. L. CRANE

IRON ORES: Lake Superior, Foreign, Concentrates, Magnetic and native Self-fluxing.**PIG IRON:** Low Phosphorus, Open-hearth, Bessemer and other grades.**STEEL:** In Blooms, Slabs and Billets, and scrap.**COKE:** For Furnace and Foundry use.

BULLITT BUILDING, 141 S. FOURTH ST., PHILADELPHIA.

ALAN WOOD COMPANY,

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,

PLATE & SHEET IRON.

ALSO LIGHT PLATES AND SHEETS OF STEEL,

No. 519 Arch Street, Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack, Tank and Boat Iron; Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

J. J. MOHR,

Bullitt Building, No. 181 South Fourth St., Philadelphia, Pa.

—SOLE AGENT FOR—

Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUNDRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.

Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

JAMES G. LINDSAY & CO.

BULLITT BUILDING, 133 South Fourth St., PHILA.

IRON and STEEL STRUCTURAL MATERIAL

For all purposes. Estimates furnished for Iron and Steel Structures.

TENSILE STRAIN. { 56,000 to 64,000 lbs.

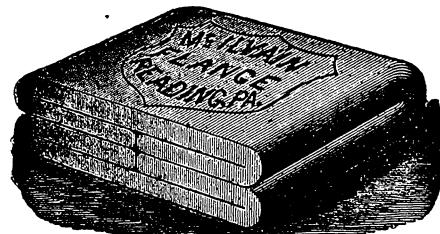
WM. McILVAINE & SONS,

READING, PA.,

MANUFACTURERS OF

**IRON AND STEEL
BOILER PLATES.**

Locomotive, Fire Box, Flange, Shell, Tank Iron and Steel, including Plates for Bridges, Girders, Stacks, Pipe and Fire and Burglar-proof Safes.



Plates 1 inch thick to No. 12. CAPACITY. { 30 feet long. { 70 inches wide.

EDITION FOR 1894.**DIRECTORY**

—OF THE—

**Iron and Steel Works
OF THE UNITED STATES.**

Embracing a complete list of the Blast Furnaces, Rolling Mills, Steel Works, Forges and Bloomeries in every State and Territory; also Wire Mills, Wire Nail Works, Car Axle Works, Car Wheel Works, Car Builders, Locomotive Works and Cast Iron Pipe Works and Wrought Iron Pipe Works, Tin Plate Works, Rod Mills, Cut Nail Works, Shipbuilding and Bridge-building Works. 304 pages, cloth.

Published by The American Iron and Steel Association.

PRICE, - - - \$5.00.

Sent on receipt of price by

DAVID WILLIAMS, - Publisher and Bookseller,
96-102 Reade Street, NEW YORK.**EDWARD J. ETTING,****IRON BROKER & COMMISSION MERCHANT**

222 S. THIRD ST., PHILADELPHIA, PA

Pig, Bar and Railroad Iron, Old Rails, Scrap

AGENT FOR THE

MOUNT SAVAGE FIRE BRICK,

Eastern Penna., West New Jersey and Delaware.

Agent TRENTON IRON CO.,

For the Sale of Wire and Wire Rope.

Longdale (Va.) and other Pig Irons.

Storage Yard, Pier No. 57 South (old Navy Yard), which is connected with Penn. R. R. and its various connections. Negotiable Warehouse Receipts issued, CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.

JEROME KEELEY & CO.,

The Philadelphia Bank Bldg., 421 Chestnut St.,

PHILADELPHIA.

Foundry & Forge Pig Irons,**Iron Ores, Coke, Coal,****Steel Blooms, Billets, Rails, etc.****Muck Bars, Blooms, Scrap Iron.**

Consulting Engineers in Metallurgy and Mining.

JUSTICE COX, JR.,

218 South 4th St., Phila., Pa.

IRON and STEEL.

—AGENT FOR—

Haldeman, Grubb & Co's.

Chickies Bessemer Pig Iron.

Mahoning Rolling Mill Co.'s

Best Quality Skelp Iron and Steel.

Pulaski Iron Co.'s

High Grade Foundry and Forge Pig Iron.

Hainsworth Steel Co.'s

Standard Bessemer Steel Billets.

Bars, Angles, Sheets, Tank and Bridge

Plates, Muck Bars, Blooms, Scrap Iron

and Tool Steel.

J. W. HOFFMAN & CO.,

Bullitt Building, 135 So. 4th St., Philad'a, Iron and Steel Merchants.

PIG IRON,

Iron and Steel Plates, Sheets, Bars and Shapes. Rails

Cars and Locomotives. Track Equipment.

CORRESPONDENCE SOLICITED.

JOHN L. HOGAN & CO.,

IRON COMMISSION MERCHANTS.

Bullitt Building, 135 South Fourth St., Phila.

Agents for Brier Hill, Lehigh, Struthers

AND MUIRKIRK PIG IRON,

Delaware Rolling Mill, muck bars. Youngstown Steel

Co., Connellsville Coke.

W. H. THOMSON & CO.,

DEALERS IN

IRON AND STEEL,**COAL AND COKE,****STEAMSHIP OUTFITS,****RAILWAY EQUIPMENT.**

ROOM 373 BULLITT BUILDING,

PHILADELPHIA, PA.

C. B. Houston. J. Max Bernard. H. H. Houston.

C. B. HOUSTON & CO.,

Bullitt Building,

PHILADELPHIA.

Pig Iron, Coal, Coke, Steel Rails, Structural

Iron, Steel Castings and Fire Brick.

Sole Agents for Paxton Rolling Mills.

STEEL AND IRON PLATES.**FRANCIS WISTER**

COMMISSION MERCHANT,

Coke, Coal, Ores.

PEA AND BUCKWHEAT (Red and White Ash).

National Foundry Coke a Specialty. Sulphur less

than 0.6.

All Sizes National Crushed Coke.

420 Walnut Street, PHILADELPHIA.

FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,
DON STEEL WORKS, SHEFFIELD.

Sole Manufacturers of

HOBSON'S "CHOICE" XX Extra Best and "Warranted Best"
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire.

SEAMAN'S "NELSON" Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

THOS. FIRTH & SONS, LIMITED, SHEFFIELD. CRUCIBLE CAST STEEL.

ABBOTT, WHEELOCK & CO., Agents and Importers of
SWEDISH IRON,

35 OLIVER ST., BOSTON.

28 CLIFF ST., NEW YORK.

S. & C. WARDLOW, SHEFFIELD, ENGLAND.

Manufacturers of the Celebrated Cast and Double Shear Steel,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch and all other Springs; also Sole Makers of the Special Brand **"TOUGH"** Cast Steel for Leather Splitting and Machine Knives of every description, and for Turning and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York. Frank S. Pilditch, Agent.

CARLISLE KAYSER, ELLISON & CO., SHEFFIELD,
WORKS, ENGLAND

Late WILSON HAWKSWORTH, ELLISON & CO.,

(ESTABLISHED 1825.)

CRUCIBLE STEEL AND STEEL WIRE.

WETHERELL BROS., Agents.

31 OLIVER STREET, BOSTON.

93 LIBERTY STREET, NEW YORK.

JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Corset Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes.

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER),

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

JESSOP'S STEEL

MANUFACTURED BY

OF Best Quality,
IN Bars, Sheets AND Plates.

Large assortment of sizes in stock at

91 John St.,

NEW YORK.

And other Agencies.

WM. JESSOP & SONS, L'D.

SHEFFIELD,
ENGLAND.

Gold Medal Paris,
1889.

"F. W. MOSS" SHEFFIELD STEEL & FILES

For further particulars apply
to
NEWTON &

SHIPMAN.

83 John St., New York.

Prices for Direct Importation in Wholesale Quantities From Sheffield.
Improved Mild Centered Cast Steel for Taps, Reamers, &c. £59 Per ton in Sheffield.
Warranted Extra Cast Steel for Taps, Dies, Milling Tools, &c. 50 " " "
Warranted Cast Steel for tools, Taps, Dies, Turning Tools, &c. 44. 10/ " " "
Best Crucible Machinery Steel 30 " " "
Best C. S. EXTRA WEIGHT HAND CUT FILES. @ 50% & 4% cash discount " "

No charge for extra sizes when steel is ordered in wholesale quantities of assorted sizes.

MIFFLIN WHEELER.

G. W. NICOLLS

Nicolls, Wheeler & Co.,
FORMERLY
SITES, WHEELER & CO.,
216 South Third St., Philadelphia, Pa.

—DEALERS IN—

IRON AND STEEL SCRAP.

Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.
Steel and Iron Plates, New and Old Halls.

Stay-Bolt,
Rivet, D. Link,
Axe, Hatchet,
Carriage and
Wagon Axle

IRON.

Superior Quality Refined Bar Iron
"VULCAN" AND "LOCKHART" BRANDS.



SMALL CHANNELS AND ANGLES,
HEXAGON IRON AND STEEL.

All
Merchant Bar
Sizes
of
Soft
STEEL.

CAMBRIA STEEL, Steel Rails, STANDARD AND LIGHT WEIGHTS, Street Rails and Railway Fastenings,

BESSEMER AND OPEN HEARTH BLOOMS, BILLETS AND BARS.

Steel Axles, Steel Angles, Steel Channels, Steel Forgings

CAMBRIA IRON COMPANY,

Office, 218 S. Fourth St., Philadelphia.
Chicago Office, Phoenix Building.
(WORKS AT JOHNSTOWN, PA.)

New York Office for Rails and Fastenings, 33 Wall Street.

Manufacturers of
Iron and Open-Hearth
Steel Bars and Structural Shapes, Car and
Engine Axles. . . .

Pencoyd Iron Works.

Works, Pencoyd, Pa.

Office, 261 S. 4th St., Phila., Pa.

A. & P. Roberts & Co.

Designers and Builders of

Bridges, Viaducts, Train-Sheds, Elevated Railroads and All Iron and Steel Structures. .

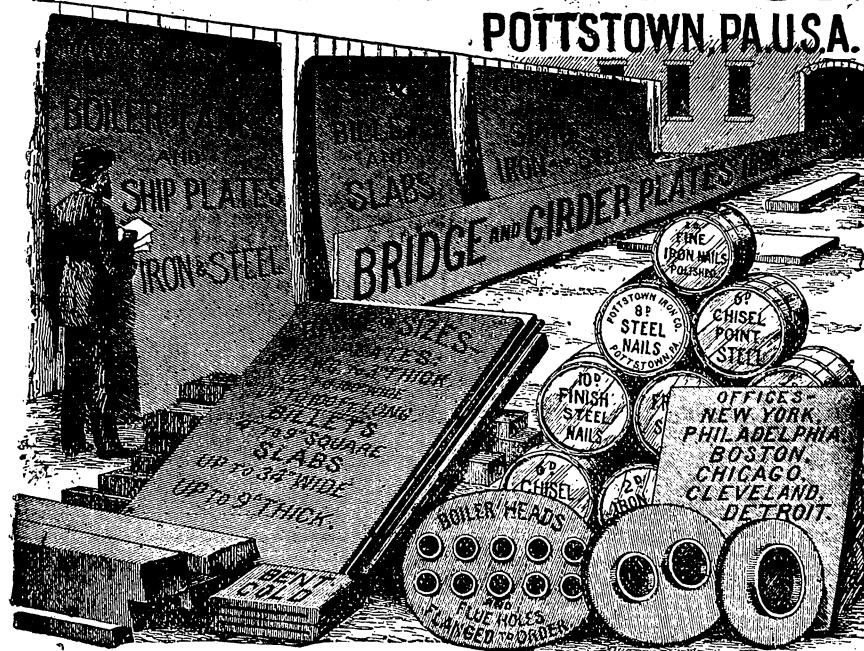
A. MILNE & CO.,
Swedish (Norway) Iron and Steel,
BLOOMS, BILLETS, BARS; WIRE, RIVET AND NAIL RODS.
FOREIGN & DOMESTIC IRON & STEEL.
1 Broadway, New York. 8 Oliver Street, Boston.

E. H. Wilson. A. Kaiser. J. B. M. Hiron.
E. H. WILSON & CO.,
222 and 224 South Third St., Philadelphia
BROKERS AND DEALERS IN
IRON AND STEEL.
Correspondence solicited.

GUSTAF LUNDBERG,
Agent for N. M. HOGLUND'S SONS & CO. of Stockholm.
SWEDISH AND NORWAY IRON.
Bessemer and Open Hearth Steel.
19 KILBY ST., BOSTON.

PIERSON & CO.,
—DEALERS IN—
IRON and STEEL
OF EVERY DESCRIPTION,
29 Broadway, cor. Morris St.,
NEW YORK.

POTTSTOWN IRON CO.
POTTSTOWN, PA. U.S.A.



A. R. WHITNEY & CO.,
MANUFACTURERS AND DEALERS IN
IRON and STEEL.

AGENCIES :

CARNEGIE STEEL CO., Limited, Structural Material, Steel and Iron Columns, Beams, Channels, Shapes and Plates. Steel Beams Rolled to 24 inches deep.
PORTAGE IRON CO., Limited, Merchant Iron, Bars, Angles, Hoops and Cotton Ties.
BROOKLYN WIRE NAIL CO., Steel Wire Nails. Export Nails a Specialty.
RIVERSIDE IRON WORKS, Steel Pipe.
GLASGOW TUBE WORKS, Boiler Flues.
AMERICAN WIRE NAIL MACHINES. Over 900 working satisfactorily in the United States, 25 in Europe and 100 in Canada.
THE SEIDELL & HASTINGS CO., Charcoal Iron Boiler Plates.
Plans and estimates furnished and contracts made for Iron and Steel Structures of every description. Please address

29 Broadway, New York.
P. O. Box 33.

NORTH BROTHERS MFG. CO.,
Iron and Brass Founders,
HAVE REMOVED

their Foundry Department from 23d and Race Sts., and consolidated same with their manufacturing plant at N. E. cor. Lehigh Ave. & American St., PHILADELPHIA, PA.,
Where New Foundry Buildings have been erected.

AMERICAN
PIC IRON STORAGE WARRANT CO.,
(Bank of America Building.) 44 Wall St., N. Y.
Correspondence of Furnaces Invited.

FRANKFORD STEEL COMPANY
FRANKFORD, PHILA., PA.

Steel Railroad and Machine Forgings,
SOLID CRUCIBLE STEEL CASTINGS
AND
Best Grades of Tool and Machinery Steel.



Hundreds of testimonials showing these castings have proved the most satisfactory and economical for all purposes requiring strength and durability.

CHROME STEEL WORKS,
Brooklyn, N. Y.

AETNA-STANDARD IRON & STEEL CO.,
 MANUFACTURERS OF
BLACK SHEETS, GALVANIZED, CORRUGATED, TIN AND TERNE PLATES,
 Sheets Suitable for All Purposes, Cold Rolled or Common, Patent Leveled and Other Specialties, Roofing and Building Supplies.
BARS, LIGHT STRUCTURAL SHAPES AND RAILS.
 Bars, all sizes and qualities, Angles, Tees, Channels, Steel Tire and Toe Calk. Special Sizes and Shapes Made to Order.
 WRITE FOR CATALOGUE AND PRICES. Large Stocks Carried to Facilitate Prompt Shipment. BRIDGEPORT, OHIO.

CARBON STEEL COMPANY, PITTSBURGH, PA.

MANUFACTURERS OF

Universal Mill Plates.
 Sheared Plates and
 Sheets.



LIST OF SIZES SENT UPON APPLICATION.

Eastern Office, Havemeyer Building, New York. Western Office, Western Union Building, Chicago.

AGENCIES:

L. S. BOOMER, 647 The Rookery, Chicago, Ill. THE CONDIT-FULLER CO., Perry-Payne Building, Cleveland, O.
 GEO. KINSEY & CO., 249 West Fourth Street, Cincinnati, O. JAS. G. LINDSAY & CO., Bullitt Building, Philadelphia, Pa.

FLINT & CO.,

68 Broad St., New York,

EXPORTERS

OF

Rolling Stock, Rails and Railway Supplies
 of all kinds, Bar and Sheet Iron and
 Steel, Cast and Wrought Iron
 Pipe, Boiler Plates, Barb
 Wire, and all sorts of
 Steel and Iron Man-
 ufactures to

SOUTH AMERICA and WEST INDIES.

AGENCIES:

Quayle, Davidson & Co. - Rio de Janeiro.
 Luis de Olazarra, - - - Havana.
 Winfield S. Stern, - - - Valparaiso.
 F. L. Crosby, - - - Lima.
 E. Pavia, - - - Guayaquil.

Correspondence solicited from Manufacturers interested in export.

The Practical Brass and Iron Founder's Guide.

A Treatise on Brass Founding, Molding
 the Metals and their Alloys, etc.

By JAMES LARKIN.

Late Conductor of the Brass Foundry Department of
 the Penn Works, Philadelphia.

A New Revised and Greatly Enlarged Edition.

CONTENTS:

Among the most important and entirely new sections
 of this edition of this valuable and popular
 book are the following:

Behavior of Metals and Alloys in Melting and Congealing; Malleable Iron Castings; Wrought Iron or Mitis Castings; Manufacture of Steel Castings; Casting of Brass; Casting of Bronze; Bell Founding; Chill Casting; Casting without Core; Casting on to other Metals; Casting Iron and other Metals upon Lace, Embroideries, Fern Leaves and other Combustible Materials; Some Modern Bronzes.

In one volume, 12mo, 400 pages, \$2.50.

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS,

Bookseller and Publisher,

96 - 102 Reade Street, - New York.

R. MUSHET'S
"SPECIAL," "STEEL" "TITANIC,"
 FOR CHISELS, TAPS, DIES, CHILLED ROLL
 TURNING, PUNCHES, &c., &c.
 LATHE AND PLANER TOOLS.
 (The "Trade-Marks" of which are registered in the United States.)
 MANUFACTURED ONLY BY
 SAMUEL OSBORN & CO., - - - Clyde Steel & Iron Works, Sheffield, Eng.
 SOLE REPRESENTATIVES IN THE UNITED STATES,
 B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.
 No. 143 LIBERTY STREET, NEW YORK.

STEEL PIPE AND NAILS.



SAMPLE OF STANDARD RIVERSIDE STEEL PIPE HAMMERED COLD. (From Photograph.)



SAMPLE OF STANDARD IRON PIPE HAMMERED COLD. (From Photograph.)

PIG IRON, STEEL BLOOMS, STEEL BILLETS, SMALL STEEL T RAILS.

Riverside Iron Works, Wheeling, West Va.

REPRESENTATIVES:

CHAS. S. STEPHENS,
 No. 21 Beekman St., New York.

CASEY & DAY,
 No. 445 Rookery, Chicago, Ill.

E. R. MANN & CO.,
 No. 147 So. 4th St., Philadelphia, Pa.

THE HAZEN CO.,
 No. 59 W. 4th St., Cincinnati, O.



PASSAIC ROLLING MILL CO., Paterson, N. J.

MANUFACTURE

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Werk, Fergings, Eye Bars, &c., &c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

ESTABLISHED IN 1848. **SINGER, NIMICK & CO., Ltd.** PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled

STEEL.

Warranted Equal to any Produced.



HIGH GRADE SPECIAL Crucible Tool Cast Steel, for all purposes requiring the very finest quality.

SINGER'S ANNEALED EXTRA Crucible Tool Cast Steel, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an extra fine quality.

BEST Crucible Tool Cast Steel, for all purposes requiring steel of Standard quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.

SAW STEEL, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

HOT ROLLED SHEET STEEL, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.

BRIGHT COLD ROLLED SHEET and **STRIP STEEL**, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequalled finish and accuracy of gauge.

ROUND MACHINERY STEEL, for Shafting, Rollers, Spindles, &c., &c.

"Iron Centre" Cast Plow Steel.

"Soft Steel Centre" Cast Plow Steel.

"Soft Steel Back" Cast Plow Steel.

"Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft Center) Plow Steel.

Crucible Cast Plow Steel.

Steel Rotary Harrow Discs.

Finished Rolling Plow Colters.

Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at 243 Pearl and 18 Cliff Streets, NEW YORK, by

HOGAN & SON, General Agents for Eastern and New England States.

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

LA BELLE STEEL CO.,

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa.

MANUFACTURERS OF ALL KINDS OF **STEEL SPRINGS, AXLES, RAKE TEETH, Etc.**

WETHERELL BROS., EASTERN REPRESENTATIVES, 31 Oliver St., Boston, and 93 Liberty St. N.Y.

Canadian Agent, W. G. BLYTH, No. 76 York St., Toronto, Ont.

— SOHO IRON & STEEL WORKS —

MOORHEAD & MC CLEANE CO.
MANUFACTURERS OF

PLATE IRON & STEEL.
GALVANIZED PLATES (SPECIAL WIDE AND EXTRA LONG) & SHEETS (SPECIAL WIDE AND EXTRA LONG) SKELP IRONS CORRUGATED & ROOFING IRONS

SOHO CHIB TRADE MARK

SHEET IRON

OFFICES AND WORKS.
PITTSBURGH.

EASTERN WAREHOUSE.
No. 81 JOHN STREET,
NEW YORK.

WESTERN WAREHOUSE.
Nos. 16 & 18 W. LAKE ST.
CHICAGO.

W. Dewees Wood Co.,



MANUFACTURERS OF PATENT

PLANISHED SHEET IRON.

PATENTS :

Dec. 10th, 1878. Mar. 4th, 1884. Aug. 31st, 1886.
Jan. 10th, 1882. April 15th, 1884. Jan. 1st, 1889.
Jan. 1st, 1884. June 10th, 1884. Jan. 17th, 1893.
Feb. 12th, 1884. Jan. 6th, 1885.

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

— ALSO —

Wood's Smooth Finished Sheet Irons and Sheet Steel, Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS:

MCKEESPORT, PA.

Branch Office: 111 Water Street, Pittsburgh, Pa.

J. TATNALL LEA & CO.,

No. 125 So. 4th St., PHILADELPHIA.

Bessemer, Mill and Foundry Pig Iron, Steel Billets, Muck Bars and Iron Ores.

THE ALLENTOWN ROLLING MILLS,

MANUFACTURERS OF

Pig Iron, Merchant Bar Iron, Rolled Shafting, Mine Rails, I-Beams, Tee Bars, Fish Plates, Bolts, Nuts and Spikes.

Transfer and Locomotive Turn Tables, Blast Furnace, Rolling Mill and Mining Machinery, Mining Pumps, Etc. Roll Trains, Shears, Punches, Iron Trucks, Etc. Builders of all classes of Machinery. Makers of Castings of all descriptions for Cable and Electric Railway.

"CATASAUQUA"
HIGH GRADE
Bars.

CATASAUQUA MFG. CO.

Charles K. Barns & Co., Agents,
224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO.,
257 So. 4th St., Philadelphia.

Dunbar Foundry and Forge Irons.

Kemble Pig Iron.

Tuscarawas (Black Band).

Warner & Co's Wash Irons.

Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO.,
Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler
and Sheet Iron and General
Railway Equipments.

Old Rails, Axles and Wheels bought and sold.
26 S. 15th St., Philadelphia.

Manhattan Rolling Mill.

JOHN LEONARD,

446 to 452 West St., New York.

MANUFACTURER OF

Horse Shoe Iron and Horse Shoes.

The quality of Iron used in the manufacture
of the shoe is the original

Leonard Celebrated Iron.

OGDEN & WALLACE,

577, 579, 581 & 583 GREENWICH ST.,
NEW YORK.

IRON AND STEEL

Of every description kept in stock.

BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly
on hand.

WILLIAM H. WALLACE & CO.,

IRON AND STEEL,

66 Broadway, New York.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

THE MAHONING VALLEY IRON CO.

MANUFACTURERS OF

Bar, Band, Sheet, Plate and Tank Iron,
Angle Iron, Nails, Boat Spikes and Rivets,

YOUNGSTOWN, OHIO.

THE LANDON IRON COMPANY,
of Salisbury, Conn.

CARBONATE Charcoal Pig Iron.

35,000-44,000 Lbs. Tensile Strength.
Used for mortar carriages, government and other
guaranteed castings. Also special chilling HEMA-

TITE pig iron for car wheels chilled rolls, etc.

AGENTS:

THOS. W. STILES, 130 Water St., N. Y.

W. M. F. JARVIS & Co., Detroit, Mich.

THE
BETHLEHEM
IRON COMPANY.
SOUTH BETHLEHEM, PENNA.
STEEL RAILS,
BILLETS AND MUCK BAR,
STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.
Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - 80 BROADWAY.
PHILADELPHIA OFFICE, - - 421 CHESTNUT ST.

THE S. OBERMAYER CO.,

Cincinnati, O., and Chicago, Ills.

—MANUFACTURERS OF—

FOUNDRY FACINGS, SUPPLIES and EQUIPMENTS

—IMPORTERS AND REFINERS OF—

East India Plumbago, Black Lead and Graphite.

Brass and Iron and Steel Foundries completely equipped.

General Catalogue sent on Application.

JOHN H. RICKETSON, Pres.
A. G. BARNETT, Treas.

W. L. RICKETSON, Supt.

O. G. RICKETSON, Vice-Prest.
A. G. MCCLINTOCK, Sec'y.

A. GARRISON FOUNDRY CO.,

Manufacturers of Sand, Patent Homogeneous Steel and

CHILLED ROLLS.

Ore and Clay Pulverizers, Rotary Squeezers, Haskin's Patent Double Spiral Pinions and Rolling Mill Castings
of every description.

Office: Nos. 10 & 12 Wood St., - PITTSBURGH, PA.

ROLLING MILL MACHINERY AND

ROLLS.

THE ROBINSON-REA MFG. CO., Pittsburg, Pa.

THE MONTOUR IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS.

Light Bails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

To Blast Furnace Managers:

THE Hawdon Slag Machine,

for handling blast-furnace slag, has been thoroughly tested in actual practice.

It saves labor in loading and unloading.

Slag is delivered to cars in small pieces, perfectly cooled.

It saves cost of special cars and expensive repairs.

Cost of pig is reduced and slag may be profitably used.

Write to us for further information in regard to advantages, cost of construction and terms of license, or call and see the machine in operation at our Blast Furnaces.

Cambria Iron Company, - Johnstown, Pa.,

—UNITED STATES AG'NT—

CHESS BROTHERS,

MANUFACTURERS OF A FULL LINE OF

SMALL CUT NAILS, TACKS, SHOE NAILS, ETC

Always in stock. Special goods made to order.

SOFT STEEL PLATES.

Suitable for Implement manufacture and for all Blanking or Stamping uses, of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive; in widths up to 15½ inches and to multiples of lengths desired. Finished black or scaled. And

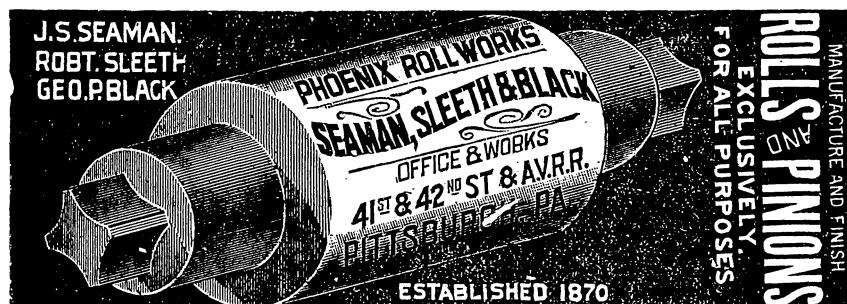
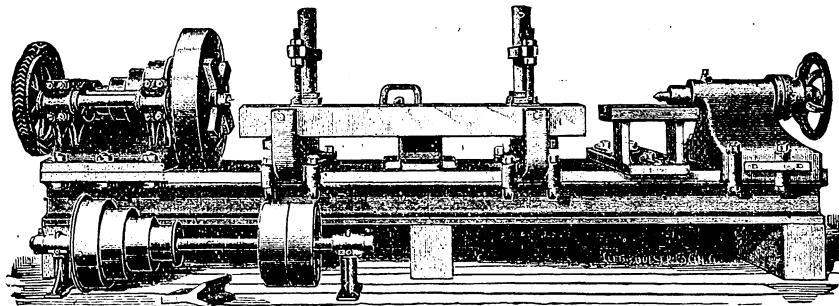
EXPANDED METAL

In all its varieties of

Fire-Proof Lath, Fencing, Tree Guards, &c.

Send for catalogues and prices.

Office, 531 Wood St., PITTSBURGH, PA.

**NEW IMPROVED STANDARD ROLL LATHE.**

Made by **TOTTEN & HOGG I & S FOUNDRY CO.**, Pittsburg, Pa., Manufacturers of **CHILL ROLLS AND ROLLING MILL MACHINERY.**

GEORGE MESTA, Pres.

W. D. ROWAN, Sec.

J. O. HORNING, Treas.

LEECHBURG FOUNDRY & MACHINE CO.,

Office: LEWIS BLOCK, Pittsburgh, Pa.

Sheet and Bar Mills, Shears, Squeezers and Roll-Lathes

ROLLS. MESTA'S PATENT PICKLING MACHINES AND TIN PLATE MACHINERY.

ESTIMATES GIVEN ON COMPLETE TIN PLATE PLANTS.

RAIL.
BEAM.
BAR.**ROLLS** STRUCTURAL.
SPECIALS.
SHAPES.**EAST CHICAGO FOUNDRY COMPANY,**

Office, 716 "The Rookery,"

CHICAGO.

DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.

Sole Manufacturers of Ahlstrom's Patent Parallel Double
EXPANSION BOLTS,
also Single Expansion Bolts. Catalogues mailed on Application.

W. C. BOONE MFG. CO. - Office and Factory, - BOONTON, N. J.

BIRMINGHAM IRON FOUNDRY,

BIRMINGHAM, CONN.

CHILLED ROLLS AND ROLLING MILL MACHINERY,

McCoy Patent Mill Pinions,

Shears, Rotary Squeezers,

WIRE DRAWING MACHINERY

Special Rolling Machines for Gun Barrels, Hoes, Pick and Axe Polls, Odd Shapes and Tapers.

ESTABLISHED

1836.

POWDER

FOR

Blasting, Mining and Sporting.
ORANGE BRAND.**ELECTRIC BLASTING APPARATUS**

SAFETY FUSE, &c.

Send postal card for Illustrated Pamphlet, showing sizes grains Powder, and describing Blasting Apparatus. Mailed FREE.

LAFLIN & RAND POWDER CO.,
New York Office, 29 Murray St.**DYNAMITE,****RED STAR BRAND,**

For Mining, Quarrying and Stump Blasting.

Safety Fuse, Caps, Platinum Fuse, Leading and Connecting Wire, with every other requisite for Blasting Purposes. The especial attention of the hardware trade is invited to our line of goods.

NEW YORK POWDER CO.,
62 Liberty St., New York.**Patent Tumbling Barrels.**

MANY VARIETIES

For all Kinds of Work.

Send for new Catalogue.

HENDERSON BROS., WATERBURY, CONN.

S. CHENEY & SON,
GRAY IRON CASTINGS,
CHEAP HEATING STOVES,
DIAMOND THIMBLES,

MANLIUS, N. Y.

DONALDSON IRON COMPANY.

MANUFACTURERS OF

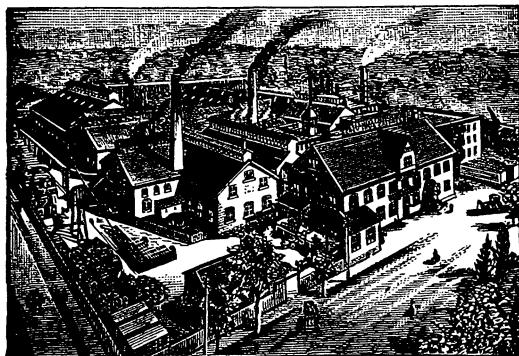
CAST IRON PIPE,
And Special Castings for Water and Gas. Also Flange Pipe.
EMEAUS, LEHIGH CO., PA.**FINE GRAY IRON**

FRANKLIN IRON FOUNDRY,

The Burr and Houston Company

83-89 Franklin Street, Brooklyn (Greenpoint), N. Y.

Special Attention Given to Fine Castings.
Telephone Call, Greenpoint 174.



Sessions Foundry Co., BRISTOL, CONN. IRON CASTINGS TO ORDER.

We make small and large castings of all descriptions, of best quality, and at very low prices.

CORRESPONDENCE SOLICITED.

R. D. Wood & Co. 400 Chestnut St.,
PHILADELPHIA.

SOLE MAKERS OF THE

TAYLOR REVOLVING-BOTTOM GAS PRODUCER.

Patented in the
United States
and all Foreign
Countries.

The best Producer for either
Bituminous or Anthracite coal
or Lignite; absolutely continuous
in operation, as the fire is
cleaned without stopping the
flow of gas. Less labor required
and less waste than in any other
Producer. Producer Gas for
firing Lime, Brick and Pottery
Kilns, Sugar-house Char Kilns,
Boilers, etc.

Also applicable to
all Regenerative
Furnaces.
Send for Pamphlet

CAST IRON PIPE

MATHEWS'
FIRE HYDRANTS
EDDY VALVES,
VALVE
INDICATOR POSTS.
Heavy Loam Castings
Special Machinery,
Water Power Pumps
and
TURBINES.

HYDRAULIC JIB and TRAVELING CRANES,
FREIGHT and CAR LIFTS, Etc.
GAS HOLDERS and GAS MACHINERY.

Light
AND
Medium Weight
**GRAY IRON
CASTINGS.**

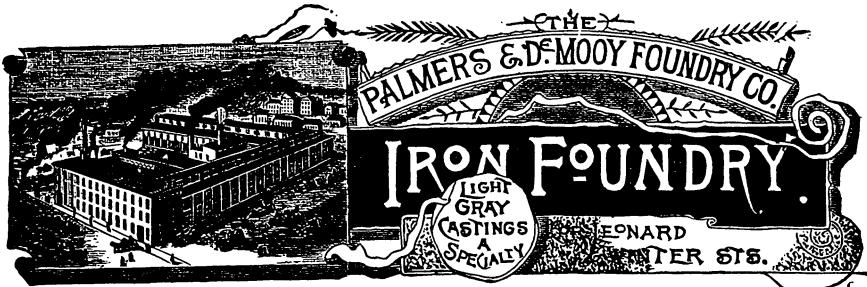
WE SOLICIT CORRESPONDENCE
WITH THOSE WHO USE THE ABOVE.

★ We claim to have
few equals and no
superiors in quality.

We have unusual capacity.
Two seven-foot cupolas.

The Taylor &
Boggis Fdy. Co.

521 Seneca St., Cleveland, O.



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. Metal Patterns designed and made. Also Japanning and Galvanizing. CLEVELAND, O.

**STEEL
CASTINGS**
FROM 1 to 40,000 POUNDS WEIGHT,
Of Open Hearth, Chester or Bessemer Steel.
True to Pattern. Sound. Solid.
Gearing of all kinds, Crank Shafts, Knuckles for Car Couplers.
Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives.
Steel Castings of Every Description.
Chester Steel Castings Co.
Works, Chester, Pa. Office, 407 Library St., Philadelphia, Pa.

I. S. SPENCER'S SONS, Guilford, Conn.,

— MAKE TO ORDER —

FINE GRAY IRON CASTINGS OF BEST MATERIAL AND WORKMANSHIP.

Sound and Smooth BRASS and BRONZE CASTINGS and HARDWARE.

We have Machine Shop and Electro Plating Facilities.

SAMPLES SOLICITED FOR ESTIMATES

FOUNDRY FACINGS
F sold under the name of "Radiant" are known all over the world as the best and are used by progressive foundries who want to turn out good clean castings.

If you don't use it and
wish to try some send
for free sample.

THE J. D. SMITH FOUNDRY SUPPLY CO., - CINCINNATI, O.

STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO.

HEADQUARTERS FOR —

LIGHT GRAY IRON CASTINGS,

— UNEQUALED IN —

SOFTNESS and SUPERIOR FINISH.

Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can please you.
Send samples for prices.

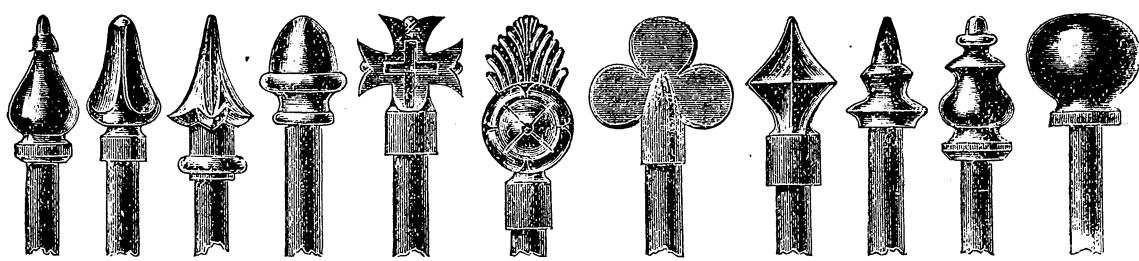
SHICKLE, HARRISON & HOWARD IRON CO.

FOUNDERS OF

**OPEN HEARTH
STEEL CASTINGS,**

FROM 15 LBS. TO 15 TONS IN WEIGHT.

ST. LOUIS.



Fence Tops.
—
TORRANCE IRON CO.,
TROY, N. Y.

IRON CASTINGS.

WILCOX, CRITTENDEN & CO.,
MIDDLETOWN, CONN.

ESTIMATES GIVEN ON ALL
KINDS OF
HEAVY MACHINERY AND
CASTINGS.

THE BEST EQUIPPED FOUNDRY AND MACHINE SHOP IN AMERICA FOR HEAVY WORK.

THE WALKER MFG. CO..
CLEVELAND, OHIO.

THE GARTLAND FOUNDRY CO.,

MANUFACTURERS OF

Light Work our Specialty. **Soft Grey Iron Castings.** We are prepared to do Japanning and Galvanizing.
UNION and ECHO STS.,
Cleveland, Canton & Southern R. R.,
CLEVELAND, O.

Castings.

| BRASS, COPPER, COMPOSITION AND GRAY IRON. |

Small and Medium, of Fine Quality and at Low Prices.

THE R. E. PARSONS CO.,
Correspondence
Solicited.
BRIDGEPORT, CONN.

GRAY IRON, BRASS, ALUMINUM and ALUMINUM BRONZE CASTINGS
of the very best quality.

Very much time saved by using clean and soft castings. We use only the best material. A trial will convince you. **PICKETS** and **ROSETTES** for Wire Workers. Catalogue of same. **NICKEL PLATING** and **JAPANNING**, also **METAL PATTERN MAKING** and **LIGHT MACHINE WORK**. We invite correspondence.

HAIGHT & CLARK, - - ALBANY, N. Y.

Standard Books On METALLURGY

A Treatise on the Metallurgy of Iron.

Containing outlines of the history of iron manufacture, methods of assay and analyses of iron ores, processes of manufacture of iron and steel, &c. By H. Bauerman, F. G. S., associate of the Royal School of Mines. Fifth edition, revised and enlarged. Illustrated with numerous wood engravings from drawings by J. B. JORDAN. 515 pages; cloth.....\$2

The Metallurgy of Steel.

Volume I. By HENRY M. HOWE, A.M., S.B., mining and metallurgical engineer; illustrated with many engravings and plates. 383 pages; 11 x 14 inches.....\$10

The Metallic Alloys.

A practical guide for the manufacture of all kinds of alloys, amalgams and solders, used by metal workers; together with their chemical and physical properties and their application in the arts and the industries; with an appendix on the coloring of alloys. Translated and edited chiefly from the German of A. KRUPP and ANDREAS WILDEBERGER, with extensive additions by W. T. BRANNT; illustrated by 16 engravings; 428 pages; cloth.....\$3.00

Steel and Iron.

Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the rolling mills, the forge and the foundry. By WILLIAM HENRY GREENWOOD, F.C.S. With 97 diagrams; 536 pages; cloth.....\$2

Electro-Plating.

A practical hand-book on the deposition of copper, silver, nickel, gold, aluminum, brass, platinum, &c. With descriptions of the chemicals, materials, batteries and dynamo machines used in the art. Second edition; carefully revised, with additions. By J. W. URQUHART; 220 pages; cloth.....\$2

The Metal Worker's Handy Book of Receipts and Processes.

Being a collection of chemical formulas and practical manipulations for the working of all the metals and alloys, including the decoration and beautifying of the articles manufactured therefrom, as well as their preservation. Edited from various sources by WILLIAM T. BRANNT. 530 pages; cloth.\$2.50

Sent, postpaid, on receipt of price by

DAVID WILLIAMS,
Publisher and Bookseller
96-102 Reade St. New York.

VULCAN IRON WORKS
CHICAGO
PILE DRIVERS

SQUARING

TRETHEWEY MFG. CO., - 47th ST., PITTSBURGH, PA.,

MANUFACTURERS OF

SHEARS.

Double Headed Rotary Shears, Shear Grinding Machinery, Circle Cutting Machines, Roll Lathes, Hardened Forged Steel Rolls, Roll Turning Tools, Solid Steel Shear Knives, Tool Steel Dies of any size, Forgings of Machinery or Tool Steel, Rolling Mill Machinery, Steam Hammers.

TURNBUCKLES

R. R. SPIKES, BAR IRON and CAR AXLES.

MADE BY

THE CENTRAL IRON & STEEL CO.
BRAZIL, IND.

Wrought Iron Open, made from the best Charcoal Iron. The only Buckle made that has a perfect Wrench Hold. Guaranteed stronger than any similar article on the market.



SMITH'S LABOR-SAVING LEATHER PATTERN FILLET.

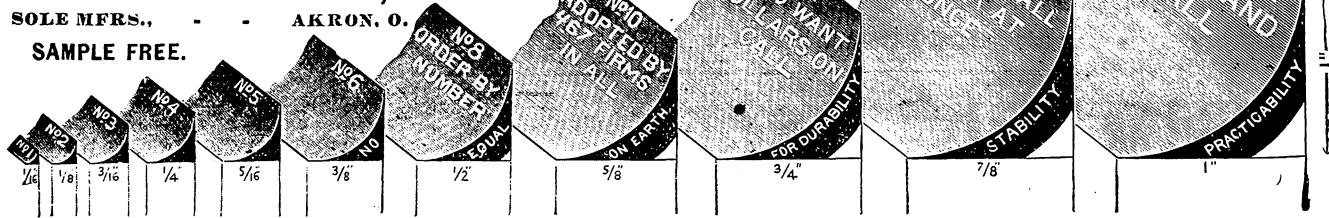
Can You Afford to Make Fillet by Hand?

We Sell to Consumers Only.

SMITH'S PATTERN WORKS,

SOLE MFRS., AKRON, O.

SAMPLE FREE.



ALEX LAUGHLIN & CO.

LEWIS BLOCK, PITTSBURGH, PA.

Gas Heating

Gas Puddling

Open Hearth

Crucible

Tube Welding.

FURNACES

AND ARTIFICIAL GAS PRODUCERS OF
EVERY DESCRIPTION, for ROLLING MILLS
STEEL AND TUBE WORKS.We guarantee to place all Plants erected by
us in successful operation.THE S. R. SMYTHE COMPANY.
ENGINEERS AND CONTRACTORS. PITTSBURGH, PA.Regenerative Gas Furnaces and Gas Producers
For All Purposes.

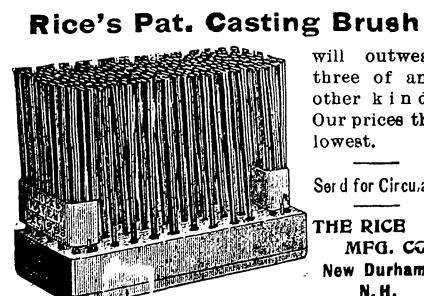
TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and operation. OVER 100
PLANTS BUILT AND WORKING.McAULEY FEED WATER HEATER AND PURIFIER. Clean Boilers Guaranteed at
small cost. No scale, better service, and saving in fuel.Wm. Swindell & Bros.
548 Smithfield Street, - Pittsburgh, Pa.
CONSULTING AND CONTRACTING ENGINEERS.Regenerative Gas Furnaces for all purposes. Duff's Patent Water Seal
Gas Producers, Swindell's Improved Gas Producers, 329 built
in three years. Patent Annealing and Enameling Furnaces.Plans and Specifications furnished at a reasonable cost for all kinds of
furnace work.JULIAN KENNEDY.
Consulting and Contracting Engineer,

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills,
STEAM AND HYDRAULIC MACHINERY, &c.

Branch Office of The Latrobe Steel Works.



will outwear
three of any
other kind.
Our prices the
lowest.

Send for Circular.

THE RICE
MFG. CO.,
New Durham,
N.H.

BOOKS

THE NEWEST BOOKS ON Metal Working, Iron, Steel and
Metallurgy; Mining, Mechanical and Civil Engineering; Casting and
Founding; Electricity and Electric Lighting; Draftsmanship;
Architecture and Building, promptly supplied on receipt of price.

SEND FOR CATALOGUES, mentioning the kind of book
you are looking for.

DAVID WILLIAMS, 96-102 Reade St., New York.

THE D. R. LEAN COMPANY,
Blast Furnace and
Steel Plant Construction,
Penn Building, Pittsburgh, Pa.

J. A. HERRICK, M. E.,
Consulting Engineer and Contractor.
Room 609, 284 Pearl Street, NEW YORK.
— STEEL CASTING PLANTS A SPECIALTY.—
 Melting and Heating Furnaces of ALL KINDS.
 Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.
 New CONTINUOUS Gas PRODUCERS.

PHILADELPHIA CORLISS ENGINES

Air Pumps. Condensers, Feed Water Heaters,
 Steel Plate Chimneys, Iron Tanks, Stand
 Pipes, Steel Buildings.

BLAST FURNACES. HOT BLAST STOVES.

Philadelphia Engineering Works, Ltd.,
 Philadelphia, Pa., U. S. A.

Selling Agents:

New York, Wm. M. Power, 121 Liberty St.
 Chicago, Wm. F. Parish Machinery Co., Home Insurance Building.

COLD DRAWN STEEL

SHELBY STEEL TUBE CO.

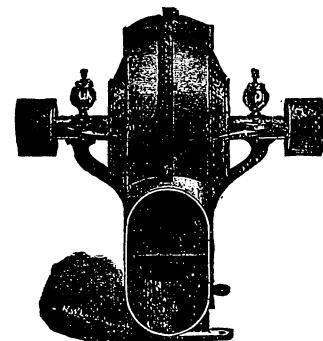


SEAMLESS TUBING

USED FOR

Bicycles, Locomotives, Yacht, Fire and Marine Boilers, and all other mechanical purposes where lightness and great strength are desired.

SHELBY, OHIO.



The Smith Forge and Pressure Blower.)

HANDLING WIND (warm or cold) IS OUR BUSINESS.

Consequently we have a right to BLOW, but as our BLOWERS have the name of moving the greatest amount of air with the same expenditure of power, we ask you to try one and let it do the BLOWING.

WE MANUFACTURE

Forge and Pressure Blowers,
Ventilating Fans,
Steel Plate Steam Fans,
Exhaust Fans.

The Huyett & Smith Manufacturing Company.
 Heating and Ventilating Engineers,
DETROIT, MICH.

CHICAGO, 31 S. CANAL ST. — Branches: — NEW YORK, 26 CORTLANDT ST.
 BOSTON, 48-54 UNION ST.

A TREATISE ON TOOTHED GEARING.

Containing complete instructions for Designing, Drawing, and Constructing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, &c. and the proper formation of Tooth Profiles. For the use of Machinists, Pattern Makers, Draughtsmen, Designers, Scientific Schools, &c. With many plates. By J. Howard Cromwell. 12mo, cloth. \$1.50.

SENT, POST-PAID, ON RECEIPT OF PRICE BY

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street,

New York City.

McCLURE & AMSLER,
Engineers and Contractors,

Bissell Block, Pittsburgh, Pa.

Blast Furnace Construction

A SPECIALTY.

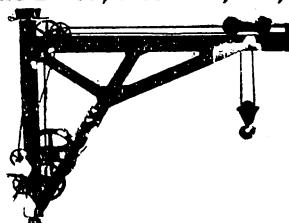
General Agents for Massick's and Crooke's Patent Fire Brick Stoves; Designs and Estimates for the construction of Blast Furnace Work, and for all kinds of Hot Blast Fire Brick or Pipe Stoves; and all other kinds of Brick Work pertaining to Steel Plants, Iron, Brick or Wooden Buildings, all kinds of Iron Construction in general.

We propose to put into successful operation all the plants we design and contract for.



Whiting Foundry Equipment Co.,
225 Dearborn St., Chicago,
 SUCCESSORS TO
DETROIT FOUNDRY EQUIPMENT CO.

CRANES,
CUPOLAS,
LADDLES,
TUMBLERS, TRUCKS, &c., &c.



The Iron-Masters'
LABORATORY

Exclusively for the
Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clay, Slags and Coal for Practical Metallurgical Purposes.

Branch Office, 339 Walnut St., Philadelphia.

All Analytical Work at Warrenton, Virginia.

J. BLODGET BRITTON.

This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes, the object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.



ESTABLISHED 1856.

HENRY MAURER & SON,
MANUFACTURERS OF
FIRE BRICK
of all Shapes and Sizes,
420 E. 23d St., New York.

B. KREISCHER & SONS,
FIRE BRICK
BEST AND CHEAPEST.

ESTABLISHED 1845.

Office, foot of Houston Street, East River, NEW YORK.
ESTABLISHED 1864.
JAMES GARDNER & SON,
MANUFACTURERS OF
"STANDARD SAVAGE" FIRE BRICK
TILE and FURNACE BLOCKS
OF ALL SHAPES AND SIZES.

WORKS, Ellerslie, Allegheny Co., Md.
OFFICE, Cumberland, Md., P. O. Box 540.

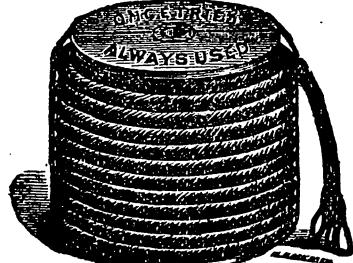
S. M. Hamilton & Co., Agents, - Baltimore, Md
Stowe, Fuller & Co., Agents, - Cleveland, O.

Established 1848.

Ostrander Fire Brick Company

Manufacture Fire Brick for all purposes.
Works at TROY, N. Y., and OSTRANDER, N. J.
Main Office, TROY, N. Y., to which correspondence
should be addressed.

Export Agent, J. W. D. McElhan, 111 Water St.,
New York City.



Send for a Sample of
Morrison's Patent Self-Lubricating Packing

ROBT. MORRISON,
5034 Arsenal St., St. Louis, Mo.

A Practical Workshop Companion for Tin, Sheet-Iron and Copper-Plate Workers. By LEROY J. BLINN
New revised, enlarged edition, with over 170 newly engraved illustrations: 206 pages; 12mo, cloth.....\$2.50

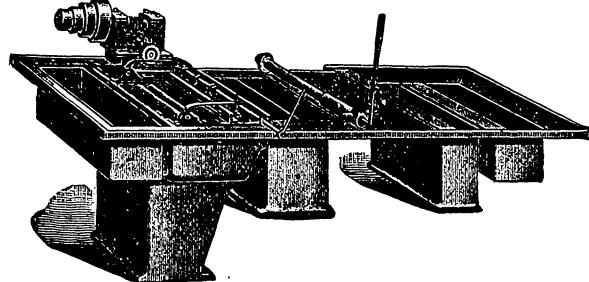
This deservedly popular book has been thoroughly revised and contains over 100 additional pages, with 170 newly engraved illustrations. The volume contains rules for describing various kinds of Patterns used by Tin, Sheet-Iron and Copper-Plate Workers: Practical Geometry; Mensuration of Surfaces and Solids: Tables of the Weights and Strengths of Metals and other Materials: Tables of Areas and Circumferences of Circles: Composition of Metallic Alloys and Solders, with numerous valuable Receipts and Manipulations for every-day use in the workshop.

Sent postpaid upon receipt of price.
DAVID WILLIAMS, 96-102 Reade St., New York

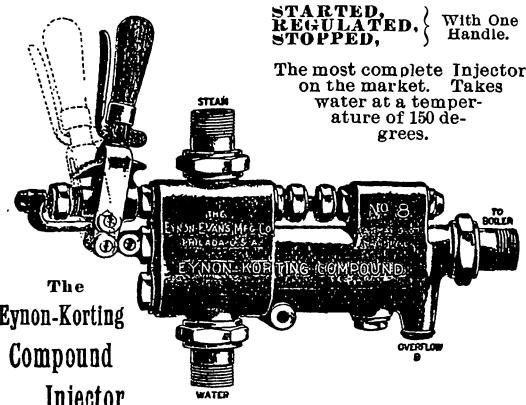


THE LLOYD BOOTH CO., **YOUNGSTOWN,**
OHIO.

Tinning
MACHINERY.



Rolling Mills,
Sand and Chill
ROLLS.



The Eynon-Evans Mfg. Co.,

PHILADELPHIA, PA.

MANUFACTURERS OF
Injectors, Condensers for Mine
Pumps, Blowers for Boilers,
Ventilators, Exhausters,
Syphons, Valves, Etc.

The most complete Brass Foundry
in Pennsylvania. Capacity 7,000
pounds per Heat.

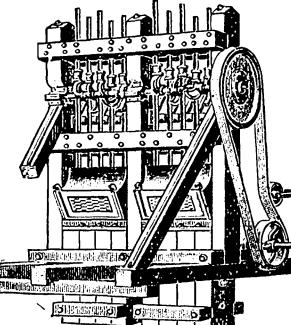
WRITE FOR PRICES.

Send for Valve and General
Catalogues.

The Edward P. Allis Company,

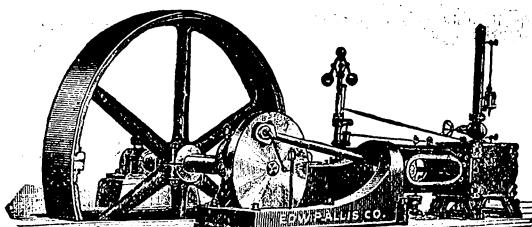
MILWAUKEE, WIS.,
MANUFACTURERS OF

BLOWING ENGINES,
HOISTING ENGINES,
PUMPING ENGINES,
AIR COMPRESSORS,
SPECIAL ENGINES
FOR
ELECTRIC LIGHTS,
STREET RAILWAYS
AND
ROLLING MILLS,



ORE CRUSHERS,
CRUSHING ROLLS,
STAMP MILLS,
CONCENTRATORS,
GENERAL MINING,
MILLING AND
SMEILING
MACHINERY.

REYNOLDS'
PATENT
VERTICAL
BOILERS.



REYNOLDS'
CORLISS
ENGINES.

NEW YORK :
26 Cortlandt St., Room 1111,
F. A. Larkin, Mgr.

MINNEAPOLIS :
416 Corn Exchange, J. F. Harrison, Mgr.

CHICAGO :
509 Home Ins. Building,
J. B. Allan, Mgr.

SAN FRANCISCO :
31 Main St.,
D. B. Hanson, Mgr.

DENVER :
1316 18th St., W. H. Emanuel, Agt.



THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas.

BOARD OF DIRECTORS:

J. M. ALLEN, President.
FRANK W. CHENEY, of Cheney Brothers Silk Manufacturing Co.
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Company.
RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.
LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.
GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.
NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.
HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.
EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.
HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.
O. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.
PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.

THE C. & C. ELECTRIC COMPANY,

—MANUFACTURERS OF—

MUTIPOLAR DYNAMOS, DIRECT DRIVEN OR BELTED,

IN SIZES UP TO 250 H.P.

Bipolar Dynamos up to 100 H.-P. Electric Motors, Automatic or Hand Controlled. Complete Plants for Power Transmission. Isolated Lighting Plants. Central Station Apparatus.

General Office, 143 Liberty St., New York. Works, Garwood, N. J., on Central R. R. of N. J.

BRANCH OFFICES: CHICAGO, Monadnock Building. BOSTON, 63 Oliver Street. CLEVELAND, Cuyahoga Building. PHILADELPHIA, 633 Arch Street.

NICKEL PLATING OUTFITS.

SEND FOR CATALOGUE OF
NICKEL & ELECTRO-PLATING
SUPPLIES & POLISHING MATERIALS.

ZUCKER & LEVETT

& LOEB CO.

8 TO 14 GRAND STREET,

NEW YORK U. S. A.

ESTABLISHED 1820.

INCORPORATED 1891.

The Hanson & Van Winkle Co.,

MANUFACTURERS OF

NICKEL AND ELECTRO PLATERS' MATERIAL

Nickel-Plating Outfits

From \$20 upward.

DYNAMO - ELECTRO MACHINES
For all purposes.

The New H. & V. W. Dynamo Machine.

In sizes from No. 1 to No. 5.

FROM \$100 TO \$800.

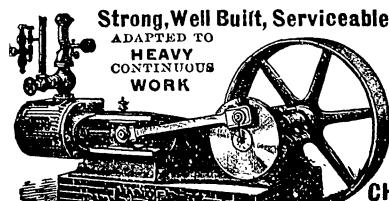
These machines will be placed on 30 days' trial with responsible parties, and if not satisfactory may be returned at our expense. Guaranteed 30% more powerful than any machine in the market at same price.

219-221 Market St., Newark, N. J.

81 Liberty St., New York.

35-37 South Canal St., Chicago, Ill.

WE FURNISH EVERYTHING.



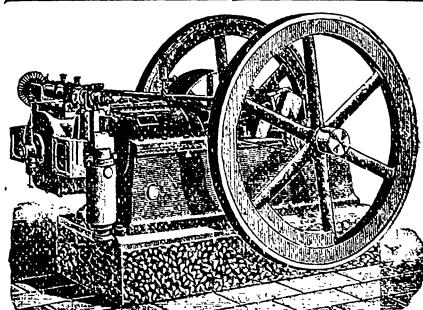
Strong, Well Built, Serviceable
ADAPTED TO
HEAVY
CONTINUOUS
WORK

STEAM ENGINES
BOILERS
CIRCULAR
AND MULAY SAW MILLS

IN STOCK FOR IMMEDIATE DELIVERY.

FOR DESCRIPTIVE CATALOGUES ADDRESS
CHANDLER & TAYLOR CO., INDIANAPOLIS, IND.

BEVEL GEARS
PLANED PERFECTLY BY PATENTED PROCESS
GLEASON TOOL CO.
ROCHESTER, N.Y.



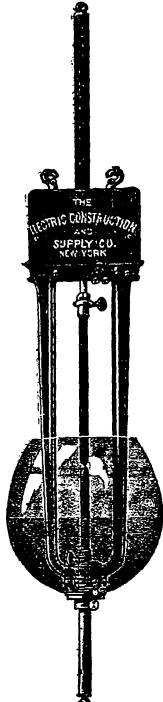
Gas and Gasoline ENGINES,

Using Natural Gas, Coal Gas, Producer, Gas and Gasoline direct from the tank, to 40 H. P., actual.

THE SPRINGFIELD GAS ENGINE CO.,
20 W. Washington St., Springfield, O.

Do You Need Light, And Good Light, And Cheap Light? ARC LAMPS WILL GIVE IT TO YOU.

We are selling now our Standard Arc Lamps for direct incandescent circuits at **\$12.00 EACH**, complete with globe and resistance, which is the lowest price at which such lamps have ever been sold.



30,000 OF THEM IN USE.

Most manufacturers do not understand that they can run **Arc Lamps** on a direct current incandescent dynamo, and obtain, for the horse-power used, more than ten times as much light from **Arc Lamps** as they would from **Incandescent Lights**, consuming the same horse-power.

These lamps are used in mills, factories, machine shops, foundries, sheds, and wherever perfect illumination is desired. Large outdoor spaces may also be lighted, the only addition necessary to the lamps being a hood to protect them from the weather.

We invite correspondence, and are always glad to furnish estimates for complete installations, including wiring, dynamos and steam plants if desired.

ELECTRIC CONSTRUCTION & SUPPLY CO.,

WALLACE ELECTRIC CO., Agents,
307 Dearborn St., Chicago, Ill.

18 CORTLANDT STREET, NEW YORK.

(Established 1881.)

Langbein's New and Splendid Book on the
Electro-Deposition of Metals.

A COMPLETE TREATISE ON

Electro-Deposition of Metals.

Comprising Electro-Plating and Galvanoplastic Operations, the Deposition of Metals by the Contact and Immersion Processes, the Coloring of Metals, the Methods of Grinding and Polishing, as well as descriptions of the Electric Elements, Dynamo-Electric Machines, Thermopiles, and of the Materials and Processes used in every department of the Art. Translated from the German of Dr. George Langbein, with additions by William T. Brant, editor of the "Technological Receipt Book." Illustrated by 125 Engravings. In one volume, 8vo, 404 pages. Price... \$4.00

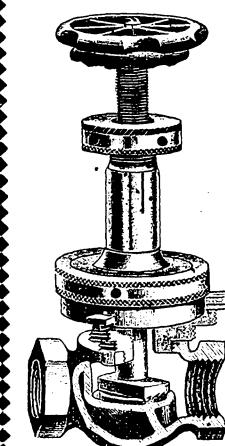
Abstract of Contents.

1. GENERAL HISTORICAL PART. CHAPTER I. HISTORICAL REVIEW OF ELECTRO-METALLURGY.
- II. THEORETICAL PART. CHAPTER II. MAGNETISM AND ELECTRICITY. I. Magnetism. II. Electricity; Electro-Magnetism; Induction; Chemical Actions of the Electrical Current—Electrolysis.
- III. SOURCES OF CURRENT. CHAPTER III. GALVANIC ELEMENTS; THERMO-FILES; MAGNETO AND DYNAMO-ELECTRIC MACHINES.
- IV. PRACTICAL PART. CHAPTER IV. ARRANGEMENT OF ELECTRO-PLATING ESTABLISHMENTS IN GENERAL; ELECTRO-PLATING ARRANGEMENTS IN PARTICULAR. LAB. V. TREATMENT OF THE METALLIC ARTICLES. (a) Mechanical Treatment; (b) Chemical Treatment. VI. PROCESSES OF ELECTRO-DEPOSITION. REDUCTION OF METALS WITHOUT A BATTERY (Electro-Deposition by Contact). VII. DEPOSITION OF NICKEL AND COBALT. VIII. DEPOSITION OF COPPER. IX. DEPOSITION OF COPPER, BRASS AND BRONZE. 1. Coppering; 2. Brassing (Culverpott Deposit); 3. Bronzing. X. DEPOSITION OF SILVER. XI. DEPOSITION OF GOLD. XII. DEPOSITION OF PLATINUM AND PALLADIUM. I. DEPOSITION OF PLATINUM. 2. DEPOSITION OF PALLADIUM. XII. DEPOSITION OF TIN, ZINC, LEAD AND IRON. I. DEPOSITION OF TIN; 2. DEPOSITION OF ZINC; 3. DEPOSITION OF LEAD; 4. DEPOSITION OF IRON (Steeling). XIII. DEPOSITION OF ANTIMONY, ARSENIC AND ALUMINUM. I. DEPOSITION OF ANTIMONY; 2. DEPOSITION OF ARSENIC; 3. DEPOSITION OF ALUMINUM. XIV. GALVANOPLASTY (Reproduction). 1. Galvanoplastic Deposition in the Cell Apparatus; 2. Galvanoplastic Deposition by the Battery and Dynamo Machines. XV. COLORING, PASSINIZING, OXIDIZING, ETC. OF METALS. LACQUERING. XVI. APPARATUS AND INSTRUMENTS. XVII. HYGIENIC RULES FOR THE WORKSHOP. XVIII. CHEMICAL PRODUCTS USED IN THE ELECTRO-PLATING ART. XIX. USEFUL TABLES. INDEX.

Sent post-paid, on receipt of price, by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 Reade Street, New York.



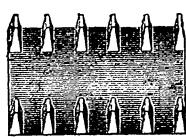
Stop the Leaks!

Insist on a Morse Valve Reseating Machine, an indispensable money-saving outfit for repairing all Flat and Taper Seated Valves and Water Faucets, making them absolutely Steam Tight, without removing the valves from the Pipe. Will pay for itself in a few weeks' time in any steam plant. Perhaps you would like to know how others like it; if so write for "How to Stop the Leaks."

The Leavitt Machine Co.,

ORANGE, MASS.

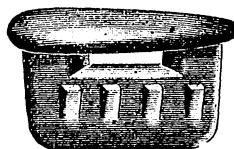
MALLEABLE BELT HOOKS AND AXE AND HAMMER WEDGES.



CLINCHING BELT HOOKS,
ALL SIZES.

Send for Prices.

SAWYER HARDWARE & SUPPLY CO.,
PAWTUCKET, R. I.

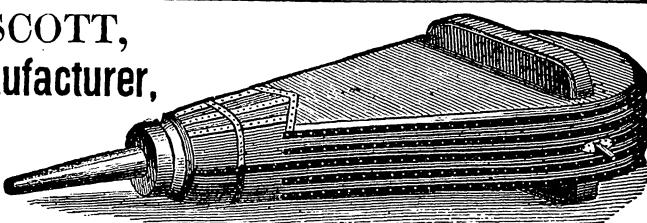


GEO. M. SCOTT, Bellows Manufacturer,

Johnson Street

Cor. 22d St.,

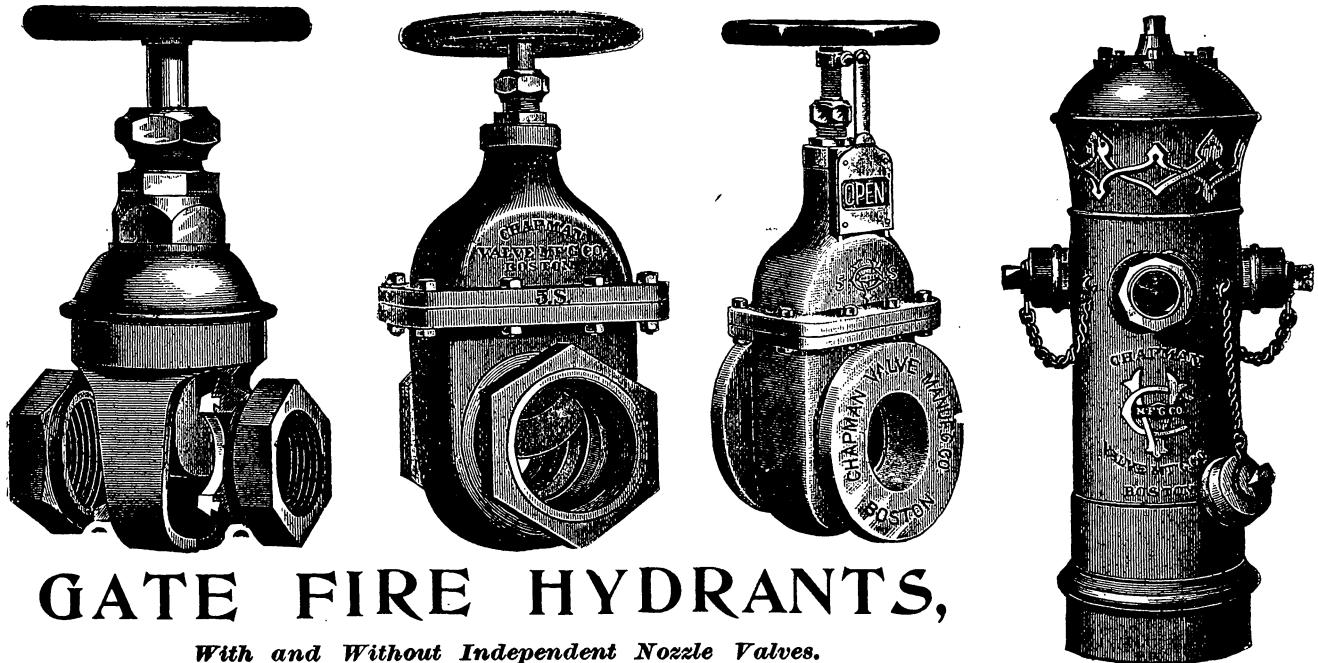
CHICAGO, ILL.



Chapman Valve Manufacturing Company,

MANUFACTURERS OF

Valves and Gates for Steam, Water, Gas, Ammonia.



GATE FIRE HYDRANTS,

With and Without Independent Nozzle Valves.

Valves and Hydrants made with Babbitt Metal Seats and non-corrosive working parts. **All Work Guaranteed.** Send for Price-List

The GENUINE CHAPMAN VALVES in all cases will bear our name in full, either rolled in or cast upon the shell, and also our Trade Mark and Monogram.

We make a Specialty of Valves for Superheated and High-Pressure Steam, 125 lbs. Pressure and Upwards.

WORKS AND GENERAL OFFICE:

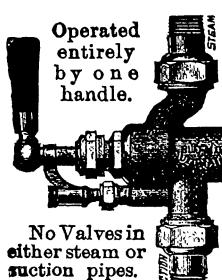
INDIAN ORCHARD, MASS.

Chicago Office, 24 West Lake Street. New York Office, 28 Platt Street.

L. M. RUMSEY MFG. CO., St. Louis, Mo., Southwestern Agents.

TREASURER'S OFFICE:

72 Kilby and 112 Milk St., Boston, Mass.



BUFFALO AUTOMATIC INJECTOR

A GRADING INJECTOR.

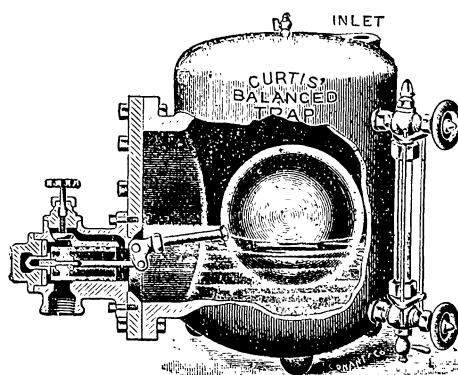
Construction and operation is such that water supply is always in proportion to supply of steam admitted and can be graded to feed continuously with steam from 20 to 140 pounds. Works perfectly whether lifting or taking supply from city pressure. Operated entirely by one handle, both in stopping and starting and grading supply of steam and water.

EAGLE EJECTORS, DUPLEX FLUE SCRAPERS, FELTHOUSEN GAUGE COCKS, IMPROVED GLASS OIL CUPS AND LUBRICATORS, CYLINDER OIL PUMPS, COMPRESSION GREASE CUPS, Etc. Send for Catalogue. ~ Menter this Paper.

SHERWOOD MFG. CO., Buffalo, N. Y.

EUROPEAN AGENTS, Green & Boulding, 21 Featherstone St., London, E. C.

Wm. A. Harris
Steam Engine Co.,
BUILDERS OF
Harris-Corliss Engines,
PROVIDENCE, R. I.



THE CURTIS Balanced Steam Trap

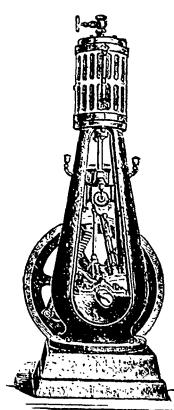
Combines More Superior Features
than any other Trap in the market.

ONE of them is that the SEAT and VALVE may be removed without breaking a joint, starting a gasket, or removing a pipe.

MANUFACTURED BY THE
D'ESTE & SEELEY CO.,
29-33 HAVERHILL ST., BOSTON.

New York: 109 Liberty St. Chicago: 218 Lake St.

Get the Best,
High Grade,
Low Price,
Plain or Automatic
VERTICAL STEAM
Engine and Boiler.
SEND FOR PRICE-LIST
AND CATALOGUE.
JOHN WESTWICK
& SON,
GALENA, ILL.



BOOKS

—ON—

Mechanical and Steam
Engineering.

The Slide Valve Practically explained.

Embracing simple and complete practical demonstrations of the operation of each element in a slide-valve movement, and illustrating the effects of variations in their proportions by examples carefully selected from the most recent and successful practice. By JOSHUA ROSE, M. E. Illustrated by 35 engravings; 100 pages; cloth..... \$1

Twenty Years with the Indicator.

Being a practical text book for the engineer or the student, with no complex formulæ. By THOMAS PRAY, JR., consulting, constructing, civil and mechanical engineer, &c. Newly arranged; complete in one volume; 284 pages; cloth..... \$2.50

Modern Steam Engines.

An elementary treatise upon the steam engine, written in plain language, for use in the workshop, as well as in the drawing office, giving full explanations of the construction of modern steam engines, including diagrams, showing their actual operation; together with complete but simple explanations of the operations of various kinds of valves, valve motions and link motions, &c., thereby enabling the ordinary engineer to clearly understand the principles involved in their construction and use, and to plot out their movements upon the drawing board. By JOSHUA ROSE, M. E. Illustrated by 422 engravings; 321 pages, 10 x 12 inches; cloth..... \$4

Richards' Steam Engine Indicator.

A treatise on the development and application of force in the steam engine. Fourth edition, revised and enlarged. By C. T. PORTER. 273 pages; 20 plates; cloth..... \$3

A Manual of Steam Boilers,

their designs, construction and operation. For technical schools and engineers. By PROF. R. H. THURSTON. Second edition; 183 engravings in text; 671 pages; cloth..... \$5

Constructive Steam Engineering.

A descriptive treatise, embracing engines, pumps and boilers and their accessories and appendages. By JAY M. WHITHAM, M. E., C. E. 900 pages; 795 illustrations, many of which are full page and folding plates; cloth..... \$10

A Treatise on Belts and Pulleys

Embracing full explanations on fundamental principles, proper disposition of pulleys, rules for determining widths of leather and vulcanized rubber belts and belts running over covered pulleys; strength and proportions of pulleys, drums, &c.; together with the principles and necessary rules for rope gearing and transmission of power by means of metallic cables. By J. HOWARD CROMWELL, Ph. B., author of a Treatise on Toothed Gearing; 271 pages; cloth..... \$1.50

Any book published sent, post-paid, upon receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller,

96 - 102 Reade St., New York.



CLOSE REGULATION.
HIGH ECONOMY.

SOUTHWARK FOUNDRY
— AND —
MACHINE COMPANY,
Philadelphia, Pa.
Sole Makers of
THE PORTER-ALLEN AUTOMATIC ENGINE,
SIMPLE, COMPOUND
OR TRIPLE EXPANSION.
Also Builders of
BLOWING ENGINES,
REVERSING ENGINES,
CENTRIFUGAL PUMPS,
BOILERS, TANKS, ETC.

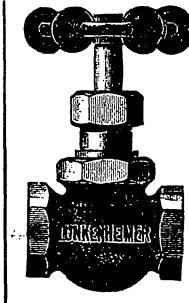
CHICAGO, 554 ROOKERY.
ST. LOUIS, 32 LACLEDE BLDG.

REGRINDING VALVES

"Lunkenheimer's"

Are used where only the best is wanted, because they always give satisfaction.

When necessary can be reground without disconnecting from pipes.



Simple. . . .
Practical. . . .
Durable. . . .
Low-Priced.

Fully described in our catalogue.

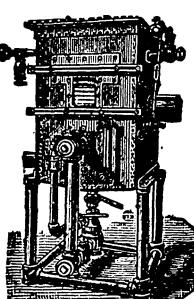
Have you one?

FOR SALE BY DEALERS EVERYWHERE.

In ordering INSIST upon our make and you will get the best. All goods warranted.

THE LUNKENHEIMER COMPANY,
CINCINNATI, O., U. S. A.

WE NEVER SOLD ONE



of our Vacuum Feed Water Heaters and Purifiers until we had first satisfied our customer that it was capable of saving money for him. Our Catalogue will make this saving clear to you. Shall we mail it? We also build the Webster Separator and Williams Vacuum System of Steam Heating.

WARREN WEBSTER & CO.,

NEW YORK, 126 Liberty Street.
CHICAGO, Monadnock Building.

No. 8.

CAMDEN, N. J.

STEAM

IS RELIEVED OF

OIL AND WATER

By passing through Webster Separators.

SEND FOR COPY OF TESTS AND CATALOGUE TO

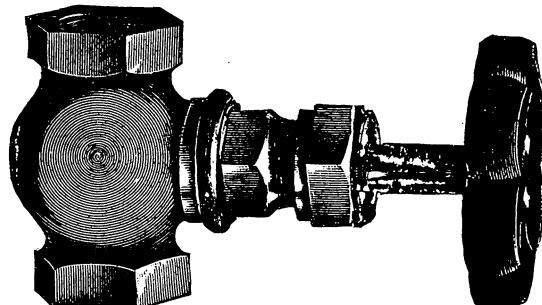
WARREN WEBSTER & CO.,

Camden, N. J.

BLAST FURNACES,
ROLLING MILLS,
STEEL WORKS,
MINES, ETC.,
ETC.



OIL WELLS,
REFINERIES,
ELECTRIC LIGHT PLANTS,
WATER WORKS, ETC.,
ETC.



McNAB & HARLIN MFG. CO.,
—MANUFACTURERS OF—
BRASS COCKS AND VALVES
For Steam, Water and Gas.

Wrought Iron Pipe and Fittings. Plumbers' Materials. Seamless Brass and Copper Tubes.

Factory, PATERSON, N. J.

56 JOHN ST., N. Y.

Catalogue and Price-List will be sent to the Trade with their first order, or by express, if desired, before ordering.



THE CONTINENTAL IRON WORKS

West and Calyer Streets, BROOKLYN, N. Y.,

—SOLE MANUFACTURERS IN THE UNITED STATES OF—

CORRUGATED FURNACES, FOR MARINE AND LAND BOILERS.

Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Thos. F. Rowland, Pres.
Thos. F. Rowland, Jr., Treas.

Warren E. Hill,
Chas. H. Corbett, Vice-Pres.

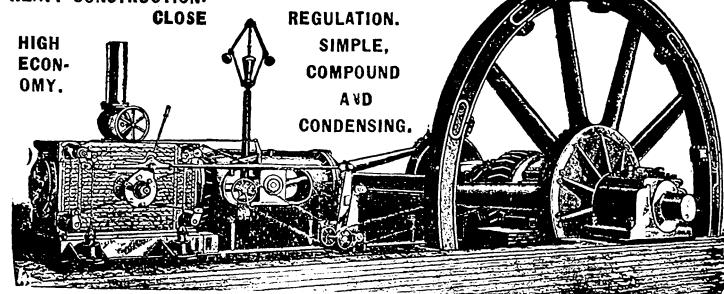
Take Ferry from East 10th or 93d Streets, N. Y., to Greenpoint.

Bass Foundry & Machine Wks.

CORLISS ROLLING MILL ENGINES.

HEAVY CONSTRUCTION.
CLOSE

HIGH ECON-
OMY.
REGULATION.
SIMPLE,
COMPOUND
AND
CONDENSING.



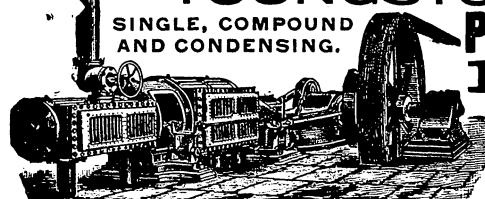
FORT WAYNE,
IND.

Boilers
and
Complete
Steam
Outfits.

WILLIAM TOD & CO.

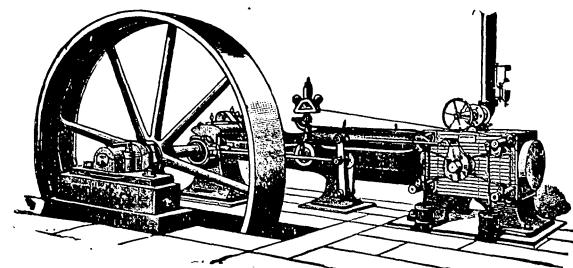
YOUNGSTOWN, OHIO.

**PORTER-HAMILTON
ENGINE**



Blowing Engines,
Hydraulic Cranes & Accumulators
Heavy Special Machinery.
ENGINE CATALOGUE ON APPLICATION.

THE LANE & BODLEY CO.



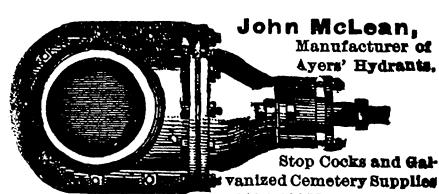
Cincinnati, O.
ENGINES,

ALL SIZES

Simple and Compound,
CORLISS ENGINES A SPECIALTY

Heavy Slide Valve Engines.

Shafting, Hangers, Pulleys,
Belt Elevator, etc.



John McLean,
Manufacturer of
Ayers' Hydrants.

Stop Cocks and Gal-
vanized Cemetery Supplies

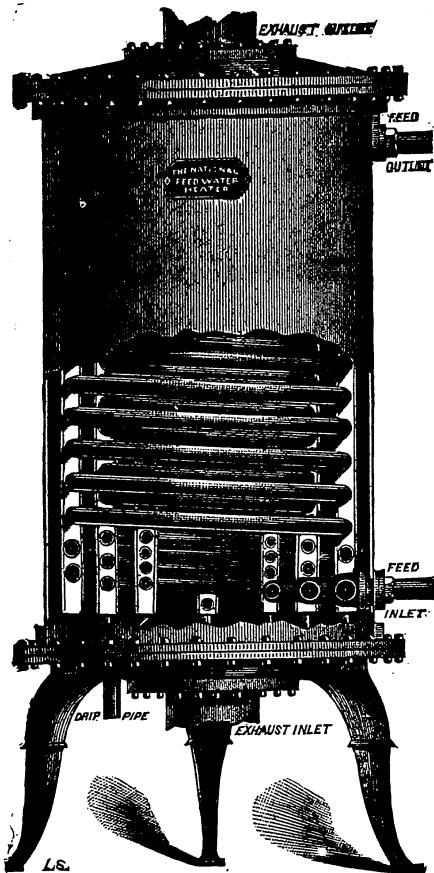
296 & 298 Monroe St., N.Y.



Every style large or small. (See Catalogue).
BOSTON GEAR WORKS, 37 Hartford St., Boston, Mass.

The National Feed-Water Heater,

Delivering Water to the Boiler at 210° to 212°.



Over 400,000 Horse-Power in Use, and Satisfaction Universal.

18 Sizes Manufactured.

From 8 to 2000 Horse-Power.

Prices Low and Every Heater Guaranteed

Catalogue with list of users furnished on application.

ALSO MAKERS OF

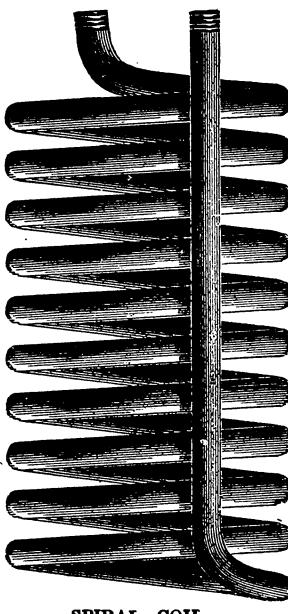
Coils and Bends of Iron,

BRASS AND COPPER PIPE.

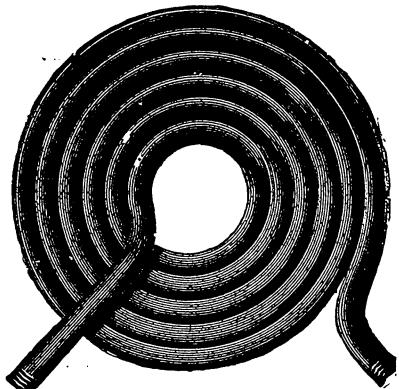
— ALL STYLES. —

THE NATIONAL PIPE
BENDING CO.,

98 River St., New Haven, Conn.

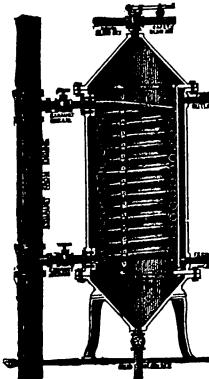


SPIRAL COIL.



FLAT COIL—CLOSE.

THE AMERICAN FEED WATER HEATER



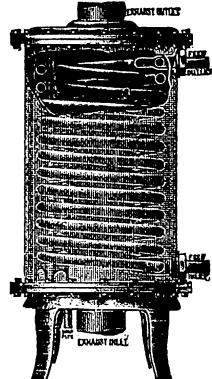
Received the First Prize at the
Mechanics' Association Fair, - - - - - Boston, Mass.

What you get when you buy the AMERICAN HEATERS:

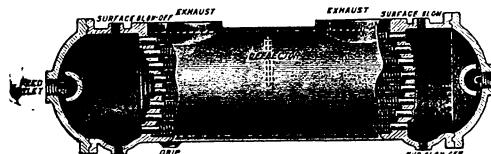
COPPER COILS,	NO RUSTING OUT,
SOLIDLY BRAZED,	NO LEAKY JOINTS,
GUN METAL FITTINGS	NO TROUBLE FROM EXPANSION,
AND CLAMP STAYS,	NO BACK PRESSURE,
STEEL SHELLS,	NO OIL IN BOILER.

We guarantee this Heater to be the Most Durable, Effective and Cheapest.

WHITLOCK COIL PIPE CO.,
27 South Street, - - - - - Elmwood, Conn.



WAINWRIGHT HEATERS.



This cut illustrates the **HORIZONTAL TYPE** of our **WATER TUBE HEATERS**. Our catalogue contains full information regarding several other styles of Heaters also information in regard to Surface Condensers and Expansion Joints. All of these appliances contain corrugated copper tubing. We shall be glad to correspond with you.

THE TAUNTON (MASS.) LOCOMOTIVE MFG. CO.

H. S. Walker, 26 W. Randolph St., Chicago, Ill.

W. C. Brown, 39-41 Cortlandt St., New York, N. Y.

The Rowell & Chase Machinery Co., 1217 Union Ave., Kansas City, Mo.

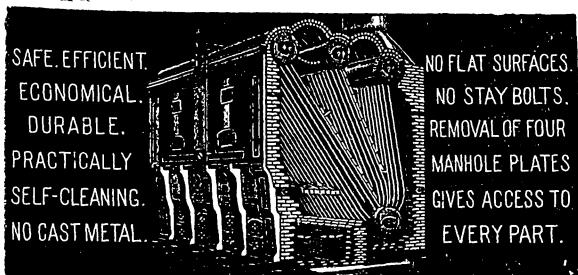
METAL PLATE WORK. Its Patterns and Their Geometry.

Also notes on metals and rules in mensuration for the use of tin, iron and zinc plate workers, &c.

By C. T. MILLIS. Second edition, revised and enlarged. 377 pages, 314 illustrations.

12mo, Cloth. - - - - - \$3.50.

Sent, postpaid upon receipt of price by DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., N. Y.



THE STIRLING WATER TUBE SAFETY BOILER.

74 Cortlandt St., New York.

418 Walnut St., Phila.

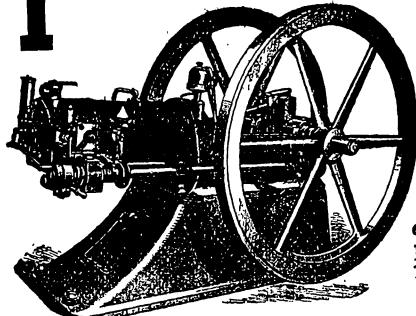
Cuyahoga Building, Cleveland.

THE STIRLING CO.,

Gen'l Offices, Pullman Building,

CHICAGO, ILL.

POWER FROM GASOLINE.



DIRECT FROM THE TANK.

CHEAPER THAN STEAM. No Boiler. No Steam. No Engineer.

FOR USE EVERYWHERE.

OTTO GASOLINE ENGINES,

STATIONARY, 1 to 120 H. P., or PORTABLE, 18 to 25 H. P.

Running Expenses, Less than one cent per horse power per hour. For large engines, one-half cent per horse power per hour. Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply. **The Best Auxiliary Power for Night Work.**

THE OTTO GAS ENGINE WORKS (Incorporated),

33d and Walnut Sts., PHILADELPHIA, PA.

CHICAGO OFFICE: 245 Lake St.

BOSTON OFFICE: 19 Pearl St.

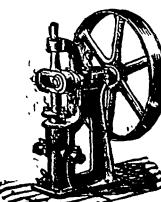


SEND FOR CATALOGUE A

POWER BOILER FEED PUMPS

In 9 sizes, for from 2 to 100 H.-P. Boilers. The large sizes are geared, all self-contained, very strong built with large bearings and are both durable and reliable. They handle hot water from heater. Special heavy brass valves. Send for catalogue and prices.

C. O. LUCAS & CO., 38 E. Front St. Greenville, Ohio.



BLINN'S TIN, SHEET-IRON and COPPER-PLATE WORKER,

A New, Revised and Enlarged Edition, from New Type, with New Engravings.

One of the Most Popular Technical Books ever published in the United States.

A PRACTICAL WORKSHOP COMPANION

TIN. SHEET-IRON AND COPPER-PLATE WORKERS.

Containing rules for describing various kinds of Patterns used by Tin Sheet-Iron and Copper-Plate Workers. Practical Geometry. Mensuration of Surfaces and Solids; Tables of the Weights and Strengths of Metals and other Materials; Tables of Areas and Circumferences of Circles; Composition of Metallic Alloys and Solders, with numerous valuable Receipts and Manipulations for every-day use in the workshop. By Leroy J. Blinn, Master Mechanic. A new, revised and enlarged edition, printed from new type, and with 170 newly engraved illustrations.

In one volume, 12mo, 296 pages, price \$2.50, free of postage to any address in the world.

It having been found necessary to make a new set of electrolytic plates and new engravings of this most popular book—the old ones having been worn out by actual use—it was determined to have the book re-edited and to add to it, in the different departments, new, recent and necessary matter. All of the old illustrations of patterns have been retained, and new ones have been added. The portion treating of metallic alloys and solders has been entirely re-written, so as to have a more systematic arrangement, and to bring it abreast with the best modern practice in this interesting and important field. In all the other departments new matter has been added, every effort having been made to render the entire work, in the future if possible, even more useful to the tin, sheet-iron and copper-plate worker than in the past.

ABSTRACT OF CONTENTS.

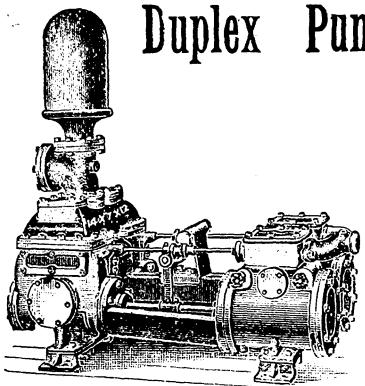
Rules for Describing Patterns; Practical Geometry; Mensuration of Surfaces; Mensuration of Solids, and Capacities of Bodies; Tables of Weights, &c.; Tables of the Circumference of Circles and of the Areas of Circles; Rules for Rendering the Tables Useful; Sizes of Tinware; Capacity of Cylinders, and various other Useful Tables and Information; Practical Receipts Varnishes, Lacquers, Cements, Metallic Alloys, Miscellaneous Receipts; Strength of Materials, with Tables Index.

Sent, post-paid, on receipt of price by

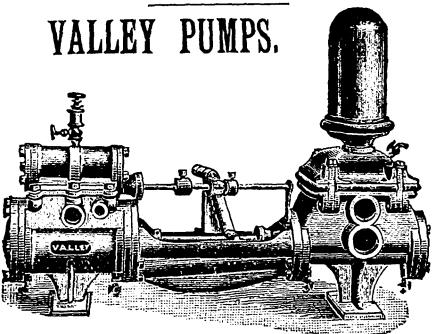
DAVID WILLIAMS, Publisher & Bookseller

96-102 Reade Street, New York.

Duplex Pumps.

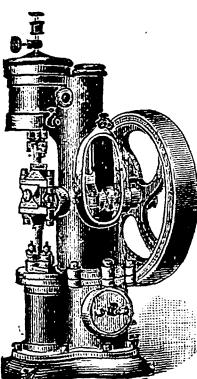


VALLEY PUMPS.



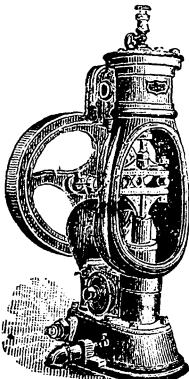
ACME

Steam Pumps



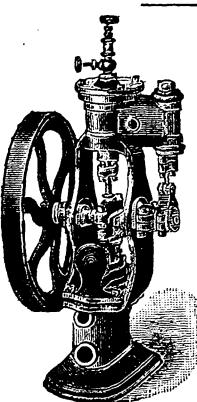
For Feeding Boilers or
forcing water against
heavy pressure.

BUCKET PLUNGER



Steam Pumps for feed-
ing Boilers, filling
Tanks, or Fire
purposes.

A. B. C.



Steam Pumps

The best low price
pump in the
world.

VALLEY PUMP WKS.

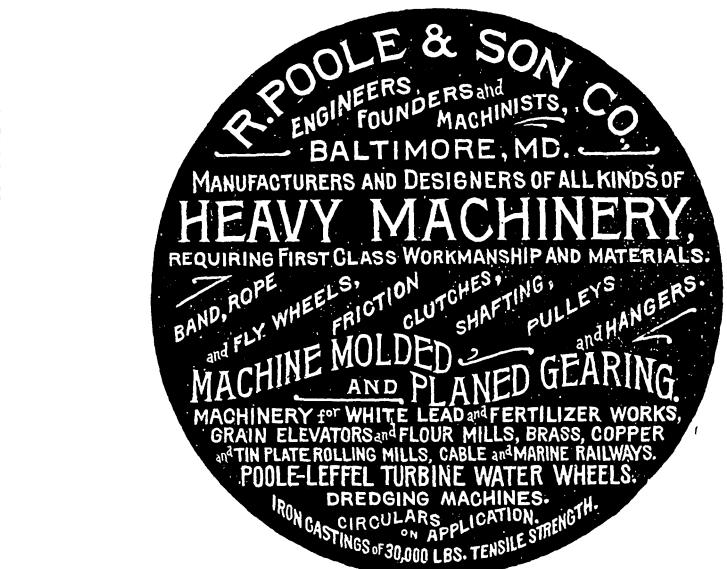
EASTHAMPTON, MASS.

Chicago Agency: 15 So. Canal St.

Awarded the Grand Prize at Late Paris Exposition.

BOSTON, MASS. 8 OLIVER ST. • PHILADELPHIA, PA. 32N. 5TH ST. • CHICAGO, ILL. 910 MASONIC TEMPLE • CINCINNATI, O. 405 NEAVE BLDG. • PITTSBURGH, PA. 408 LEWIS BLDG. • CLEVELAND, OHIO 1919 PUBLIC SQUARE • BIRMINGHAM, ALA. 101 1/2 BIRMINGHAM ST. • NEW ORLEANS, LA. 57 CARONDELET ST. • SAN FRANCISCO, CAL. SAN FRANCISCO TOOL CO. • HAVANA, CUBA. 116 1/2 CALLE DELA HABANA.

BABCOCK & WILCOX BOILERS
THE BABCOCK & WILCOX CO.
29 CORTLANDT ST.
NEW YORK
SEND FOR BOOK ON STEAM.



JUST ISSUED.

USES OF COMPRESSED AIR,

By ADDISON C. RAND.

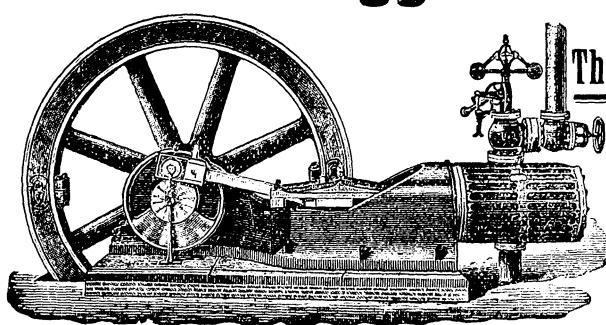
134 PAGES, 94 ILLUSTRATIONS, PRINCIPALLY FROM ORIGINAL PHOTOGRAPHS AND DRAWINGS.

This handy volume is the only comprehensive work upon the uses of compressed air; it is accurate, readably written and beautifully printed upon heavy plate paper. Price \$1.00, postage paid. Order of the publishers,

THE REPUBLIC PRESS, 14 Lafayette Place, N. Y.,

The Van Nostrand Co., G. P. Putnam's Sons, of N. Y., Damrell, Upham & Co. (the old Corner Book Store), Boston, Mass., Robt. Clarke & Co., Cincinnati, Ohio, The American News Co., and any bookseller.

Totten & Hogg I. & S. F'dry Co.,



Manufacturers of

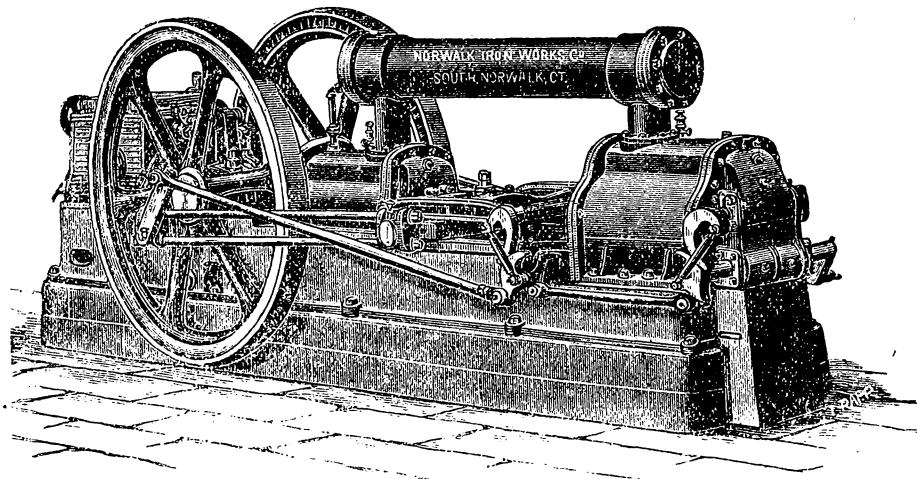
The "Aetna" Rolling Mill

ENGINE

Chilled and Sand
Rolls and Rolling Mill
Machinery,

PITTSBURGH, PA.

Air Compressors.



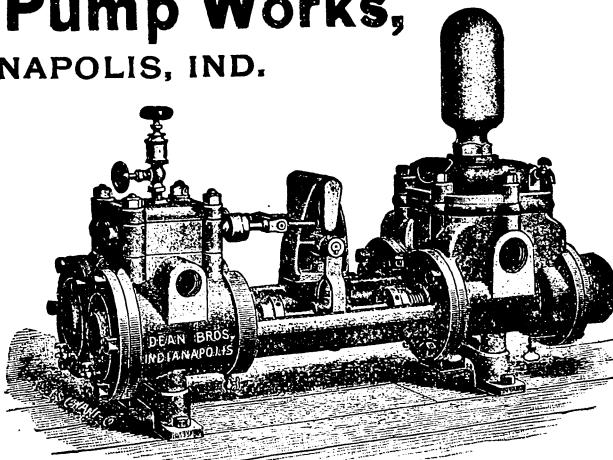
THE NORWALK IRON WORKS CO., South Norwalk, Conn.

DEAN BROTHERS' Steam Pump Works, INDIANAPOLIS, IND.

DUPLEX PUMPS.

SINGLE PUMPS.

DEEP WELL
PUMPS.

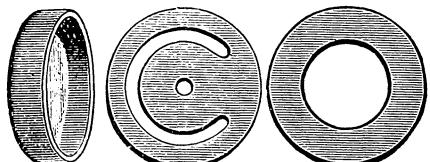


Send for Catalogue
and Prices.

CHEAPEST. HANDIEST. SIMPLEST. } PUMPS.



MASLINS, 165-167 First St., Jersey City, N.J.



**Pump Leathers
and LEATHER WASHERS**
MANUFACTURED BY
Detroit Valve & Washer Co.,
DETROIT, MICH.



The Metal Worker's Handy-Book

OF RECEIPTS AND PROCESSES,

BEING A COLLECTION OF CHEMICAL FORMULAS AND PRAG-
TICAL MANIPULATIONS FOR THE WORKING OF ALL
THE METALS AND ALLOYS, INCLUDING THE DEC-
ORATION AND BEAUTIFYING OF ARTICLES
MANUFACTURED THEREFROM, AS WELL
AS THEIR PRESERVATION.

Edited from Various Sources by

WILLIAM T. BRANNET.

500 Pages, Cloth, \$2.50.

SENT PREPAID ON RECEIPT OF PRICE BY

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade St., New York.

The JOHN H. McCOWAN CO.

PUMPS FOR EVERY SERVICE CINCINNATI, OHIO. PRICE LIST
FACTORY OFFICE 46 CENTRAL AVE. ON APPLICATION
1426 E. MAIN ST., RICHMOND, VA.

Brass founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

Worthington Steam Pumps CONDENSERS and WATER METERS. HENRY R. WORTHINGTON, NEW YORK, 86 & 88 LIBERTY STREET.

Boston, 70 Kilby St.
Philadelphia, 607 Arch St.

Cleveland, 24 South Water St.
Chicago, 185 to 189 Van Buren St.

St. Louis, Eighth and St. Charles Sts.

“HOOKER” PUMPS HAVE A WORLD WIDE REPUTATION.
MADE ONLY BY
Hooker-Colville Steam Pump Co.,
St. Louis, Mo.

The Brown Hoisting & Conveying Machine Co., CLEVELAND, OHIO, U. S. A.

Complete Systems for Handling of Materials.

THE BROWN PATENT

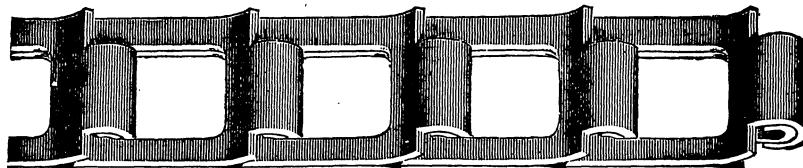
Bridge Tramway.
Cable Tramway

Shed Tramway.
Warehouse Tramway.

Sewer Machinery Tramway.
Automatic Furnace Hoist.

Traveling Crane for Shipbuilders, a perfect appliance for handling Frames, Armor Plates, etc. The Brown Patent Cantilever Derricks, in use on the Chicago Main Drainage Canal. Working Capacity of Cantilever 500 to 700 yards "solid rock in place" per day of 10 hours. **The Brown Patent Friction Clutch Hoisting Engine.**
Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

ROBERTS MANUFACTURING CO.,
2100 Smallman Street, PITTSBURGH, PA.



— MANUFACTURERS OF —

Patent Detachable Steel Link Belting, Sprocket Wheels and Shafting, also Malleable Wrought Steel Cable and Special Chains, Elevating, Conveying and Mining Machinery, Wire Rope Haulages and Tramways.

SEND FOR CATALOGUE.

JEFFREY

Roller, Steel Drag, Cable and Special Chains.
FOR
ELEVATING
AND
CONVEYING
MACHINERY
FOR HANDLING MATERIAL OF ALL KINDS.
Power Transmission
Machinery.
WIRE CABLE
CONVEYORS.
For long & short distance Conveying.

THE JEFFREY MFG. CO. 163 Washington St., N. Y.
Columbus, Ohio. Send for Catalogue.

FITCHBURG MACHINE WORKS,

MANUFACTURERS OF THE CELEBRATED

FITCHBURG MODERN
AND OTHER,
SEND FOR
CATALOGUE B.

48-inch Planer.

ENGINE LATHE
METAL-WORKING MACHINES,
FITCHBURG,
MASS.

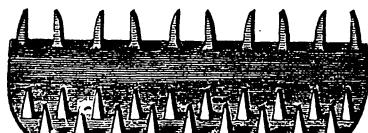
THE DURANT COUNTING MACHINES

Received the Highest Award at the World's Fair.



Send for Catalogue to
W. N. DURANT, 234 22d St., Milwaukee, Wis.
English Agent, FRED'K ULLMER, CROSS St., Farringdon Road, London, E. C.

Talcott's Combination Belt Hooks.



W. O. TALCOTT, Providence, R. I.

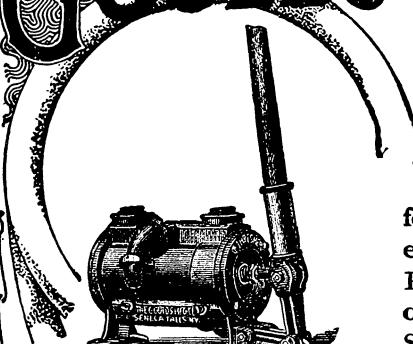
MANUFACTURER OF

Four Styles of BELT HOOKS, Including 134 Sizes.
SEND FOR CATALOGUE.

FOR THE
"Double Triple Quick Stroke"
SHAPER
WRITE TO
GOULD & EBERHARDT, Newark, N.J.



GOULD'S PUMPS Are
the "Thresher" Tank
Force Pump



Is designed to supply the demand for a cheap capacious Pump for Thresher Tank. Better than a Pitcher Spout Pump; cheaper than any other Pump, of equal capacity and adaptation. Send for circular.

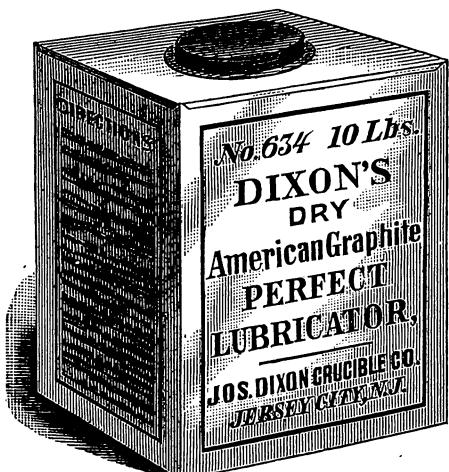
THE GOULD'S MANUFACTURING CO.,

Manufacturers of PUMPS and HYDRAULIC MACHINERY,
Works & Main Offices: Seneca Falls, N. Y., U. S. A. Warerooms: 16 Murray St., New York City.
Or Nearest Branch Agency—THE GOULD CO., 22 and 24 North Canal St., Chicago, Ill.
SMITH & WINCHESTER CO., 19 to 27 Wendell St., Boston, Mass. WOODIN & LITTLE, 312 & 314 Market St., San Francisco, Cal.
H. O. NELSON MFG. CO., Eighth & St. Charles Street, St. Louis, Mo. L. M. BATES, 321 Vine Street, Philadelphia, Pa.

FOR TESTING IRON
AND STEEL SPECI-
MENS, CAR COUPLERS,
BRAKE SHOES, CHAIN,
SPRINGS, WIRE, CE-
MENT.

RIEHL TESTING MACHINES,

Hydraulic Pumps and
Presses, Roble J acks,
Marble Machinery, Iron
Founders & Machinists.
Riehle Bros. Testing
Machine Co.,
9th St. abv. Master Phila



FAC-SIMILE OF SCREW-TOP 10 LB. TIN CAN, NO. 634.

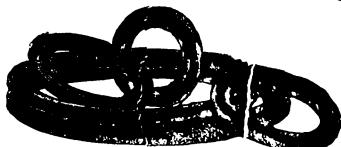
Everything that creaks, squeaks, or sticks, or runs hard, can be cured with a dose of Dixon's Dry Graphite. Every engine-room or locomotive-cab is incomplete without a box of Dixon's Graphite. The progressive engineer and machinist will find new uses for it every day.

IT IS SIMPLY INDISPENSABLE.

To those interested we will send free of charge a 20-p. pamphlet on this subject of graphite lubrication.

JOS. DIXON CRUCIBLE CO.,
JERSEY CITY, N. J.

RUBBER GOODS

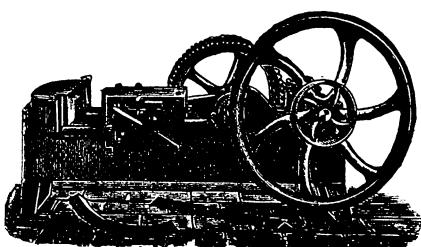


MOULDED
FOR MECHANICAL PURPOSES.
H. O. CANFIELD, Bridgeport, Conn.

Small moulded work a specialty.
Send for estimates for moulds and work.

PITTSBURGH MFG. CO.,

Manufacturers of



Crosgrove's Patent Straightening, Bending and Punching Machines.

NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

PITTSBURGH. PA.

LEVIATHAN BELTING.



Positively unequalled for Strength, Durability and Traction Power; unaffected by Heat, Steam or Water.

Belts for Main Driving and work of a heavy nature a specialty.

MAIN BELTING

COMPANY,

Sole Manufacturers,
1219-1235 Carpenter St.
PHILADELPHIA.

248 Randolph Street, Chicago.

120 Pearl Street, Boston.

Send for Price-Lists and Samples.

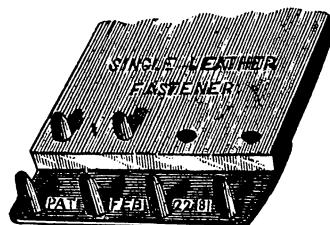
ALEXANDER BROS.

BEST OAK BELTING.

PHILADELPHIA.

Patterson, Gottfried & Hunter, Limited, agents,
146-150 Centre St., New York, N. Y.

Thacher's Patent BELT FASTENERS.

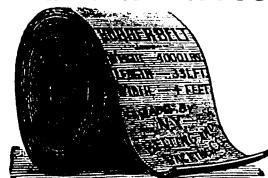


Manufactured by

The Clafien Manufacturing Co., Cleveland, O.
Office, 71 and 73 Ontario St.

NEW YORK BELTING & PACKING CO. LTD

OLDEST, LARGEST and BEST Makers of
Rubber Goods
FOR MECHANICAL USES.



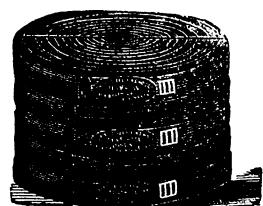
Rubber belting, hose, steam hose, brewer's hose, suction hose, "Test" fire hose, cotton hose, packing, valves, gaskets, rings, vulcanite emery wheels, rubber covered rolls, tubing, rubber cement, mats, matting, stair treads, bicycle and vehicle tires, car springs, fruit jar rings, etc. Special goods to order.



Send for Catalogue.

PIONEERS AND LEADERS.

15 Park Row, New York.



STORES: Boston, Philadelphia, Chicago, Cincinnati, Minneapolis, Cleveland, San Francisco, Detroit, Baltimore, Charleston, New Orleans, Kansas City, St. Louis, Dallas.

AGENTS WANTED IN UNOCCUPIED TERRITORY.

E. W. BLISS CO.,

11 ADAMS ST., BROOKLYN, N. Y.
Western Office,
100-104 W. Washington St., Chicago.

NO. 2 POWER SQUEEZER.

THIS machine is designed for squeezing or crimping on the tops and bottoms of square, oblong or oval cans. It is represented in the cut with a 5-gallon petroleum can in position for the work.

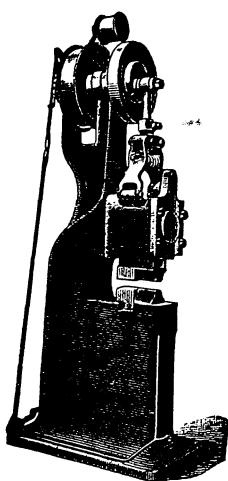
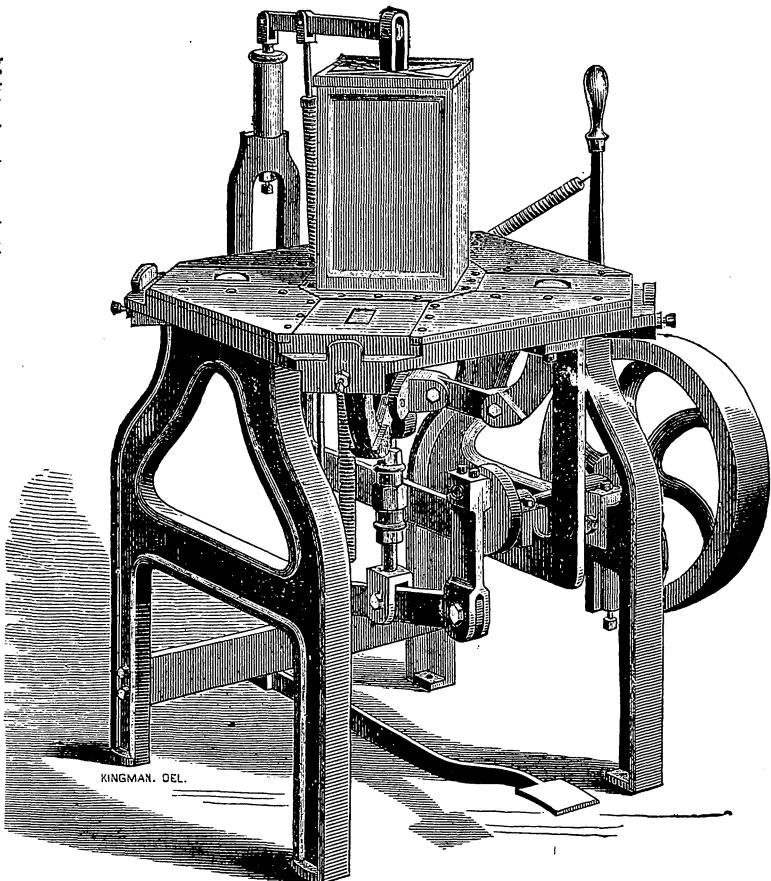
NO. 1 is adapted for meat, mustard and spice cans, powder flasks, canisters, biscuit tins and other work.

It is adapted for work not exceeding 9½ inches square, such as petroleum, varnish and other large cans.

PRESSES, PUNCHES, SHEARS, DIES, DROP HAMMERS AND SPECIAL MACHINERY.

Send for Catalogue and
Quotations.

The Stiles & Parker Press Co.



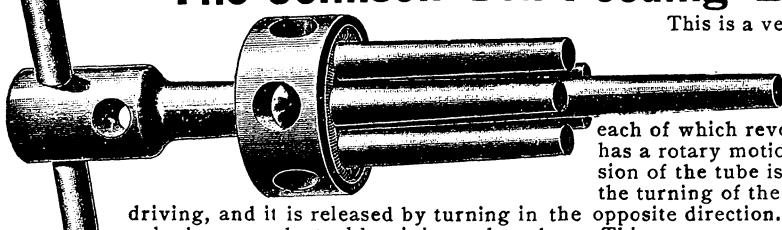
The Dupont Power Hammer.

The Dupont Power Hammer IS STILL AT THE FRONT.

Manufacturers who have use for a POWER HAMMER will find it to their advantage to write us for circular and prices. Our prices suit the times. Our Hammer is the best and will speak for itself.

The Dupont Manufacturing Co.,
ST. JOHNSBURY, VT.

The Johnson Self-Feeding Boiler Tube Expander.



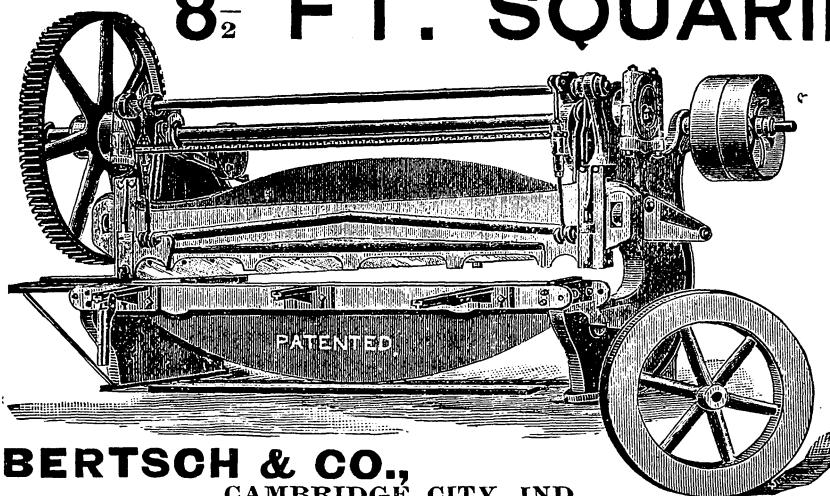
driving, and it is released by turning in the opposite direction. The driving of the centre pin of an expander not only damages the tool but injures the tubes. This never occurs with the JOHNSON TOOL. There is no part of this expander that can be broken when in use; there are no screws, no casings, no rollers on pivots. It will wear for years without costing a penny for repairs. Henry C. Ayer & Gleason Co., N.E. Cor. 2d and Diamond Sts., Central Office, No. 919 Betz Bldg., PHILADELPHIA, PA.

MILLING MACHINES AND PROCESSES.

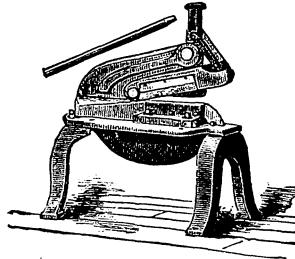
A practical treatise on shaping metals by rotary cutters, including information on making and grinding [the cutters]. By PAUL N. HASLUCK. With upward of 300 engravings, including numerous drawings by the author, 8vo, 352 pages, with 304 engravings, cloth, \$5.00.

Sent, post-paid, on receipt of price by DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., N. Y.

8¹/₂ FT. SQUARING SHEAR

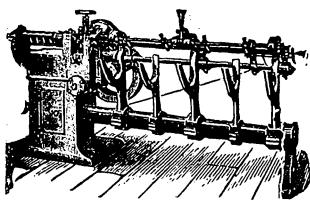


For squaring and trimming $\frac{1}{4}$ -inch plates and lighter; has 15 in., 18 in. or 21 in. throat; has Improved Quick-acting Hold-down Automatic Clutch, Drop-leaf Tables Patent Center Bearings Supports, Patent Safety Cross Head or Knife Bar arrangement.



Improved Compound Lever Stock Shears.
Three Sizes: adapted for Slitting, Trimming and Squaring Sheets, &c.

BERTSCH & CO.,
CAMBRIDGE CITY, IND.



Automatic Wire Straightening and Cutting Machine.

JOHN ADT & SON,

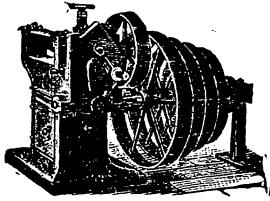
NEW HAVEN, CONN.

BUILDERS OF

Machinery for Hardware Manufacture.

BUTT MILLING MACHINERY,
BUTT DRILLING MACHINERY, RIVETING MACHINES, WIRE
STRAIGHTENING MACHINERY, FOOT PRESSES.

SPRUCE CUTTERS, ETC.



Automatic Wire Straightening and Cutting Machine.

**Ferracute
Machine Co.,**

Bridgeton, N. J., U. S. A.

Manufacturers of

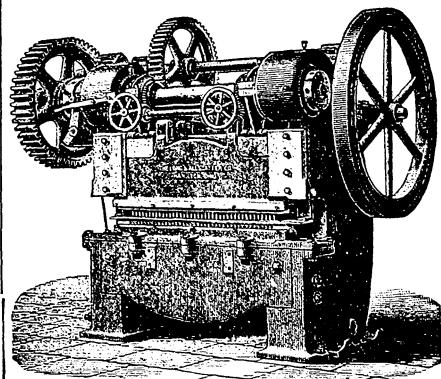
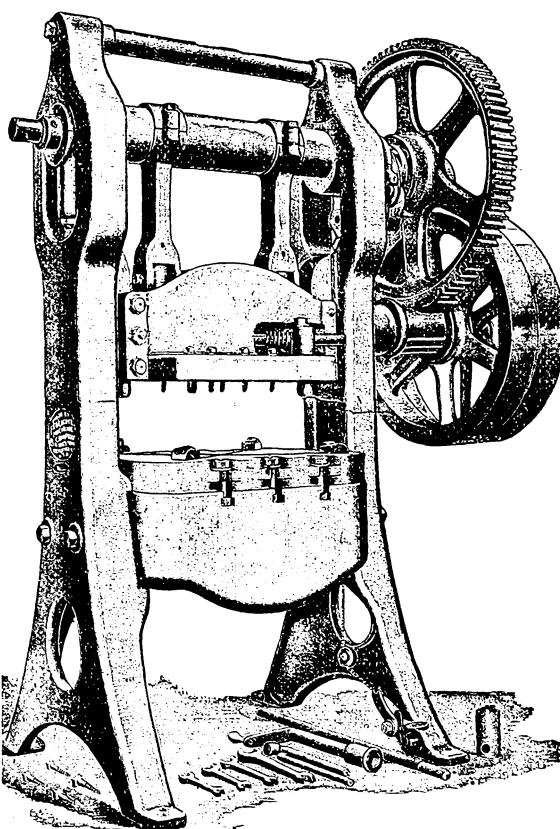
Foot and Power

**PRESSES,
DIES,**

And all other

Tools for Bar and Sheet Metals

Send for illustrated Catalogue containing sizes, weights and prices of one hundred kinds of Presses and other Tools for Brass Goods, Locks, Hardware, Nuts, Washers, Drop Forgings, Railroad, Bridge and other General Machine Shop Work, &c. Also for Tinware, Cans, Boxes, Lamps, Gas Fixtures and Silverware, &c., &c.

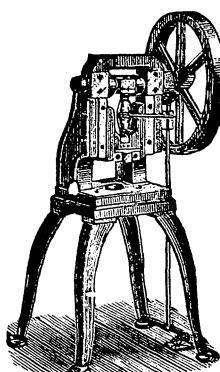


MULTIPLE PUNCH.

THE LONG & ALLSTATTER CO.,
HAMILTON, OHIO, U. S. A.

MANUFACTURERS OF

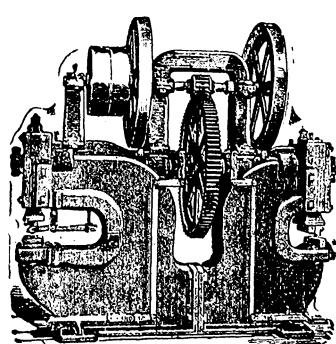
Belt Steam and Electrically Driven
Power Punches and Shears.



A. H. MERRIMAN,
MERIDEN, CONN.

Manufacturer of all Descriptions of

PRESSES.



PUNCHES & SHEARS

Double, Single, Multiple, Horizontal, Belt and Steam driven. Bending and Straightening Rolls, Spacing Tables, Doublers for Sheet and Tin mills. Sheet Metal Working Machinery of every description. Send for complete catalogue.

The Wais & Roos Punch and Shear Co.

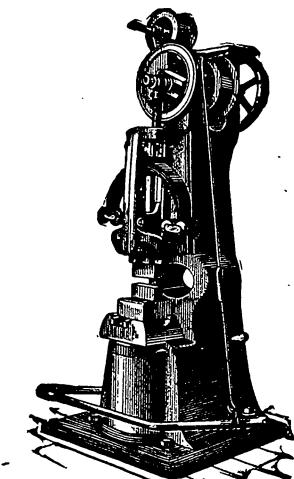
456-460 Plum St., Cincinnati, O.



MACHINISTS' SCALES,
PATENT END GRADUATION.
Liberal Discount to the Trade. Send for List.

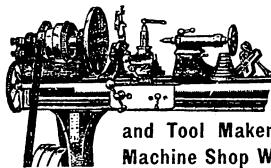
COFFIN & LEIGHTON Syracuse, N. Y.

IF YOU USE
Power Hammers
Write to us for Circulars.
SCRANTON & CO.,
NEW HAVEN, CONN.



N. Y. Office, 15 Murray St.,
Surpless, Dunn & Alder.
Chicago Office, 60 S. Canal St. H. O. Skinner.
Philadelphia Office, 1113 Arch St.,
Edwin L. McConaughy.

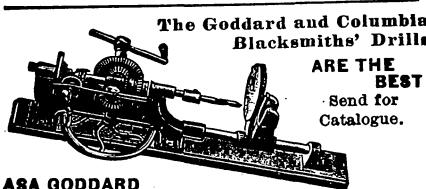
FOOT POWER LATHES



For Electrical
and Experi-
mental work.
For Gunsmiths
and Tool Makers. For General
Machine Shop Work.

High grade tools; elegant in design, superior in
construction. The best foot power lathes made,
and quality considered the cheapest. Send for
catalogue and prices.

W. F. & JNO. BARNES CO.
9 Ruby Street, ROCKFORD, ILL.



ARE THE
BEST
Send for
Catalogue.

ASA GODDARD
Manufacturer
Worcester, Mass.

B. & O. Sure Grip Horseshoers'
Adjustable Jaw Foot-Vise
Should be carried in stock by
every hardware dealer.
Blacksmiths are calling for it.
Send for List and Discount.

BUTTS & ORDWAY,
504 Atlantic Ave., Boston, Mass.



IS THE
DRILL PRESSES
DEPARTMENT OF
THE LARGEST
VARIETY
SEND FOR NEW
30 PAGE CATALOGUE
JUST OUT
DWIGHT SLATE
MACHINE CO.
NEW YORK

LINK-BELT

ENGINEERING CO.
NICETOWN.
PHILA.
49 DEY ST.
NEW YORK.

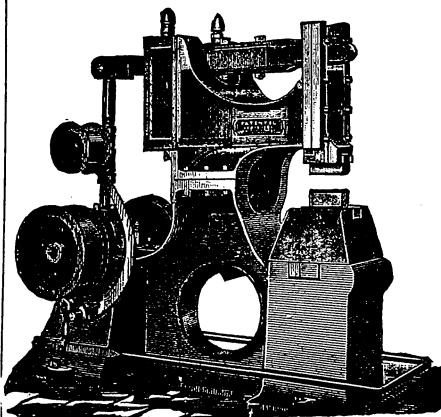
Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting
Dodge Chain, Howe Chain, &c.

General Eastern Agents for Fibre-Graphite Journal Bearings for shafting and machines. Require no oil
or other lubricant. Moderate in price, durable and guaranteed. Bearings furnished to fit hangers now
in use.

WESTERN CONNECTION

[CHICAGO,] LINK BELT MACHINERY CO.

JENKINS' **POWER HAMMERS.**



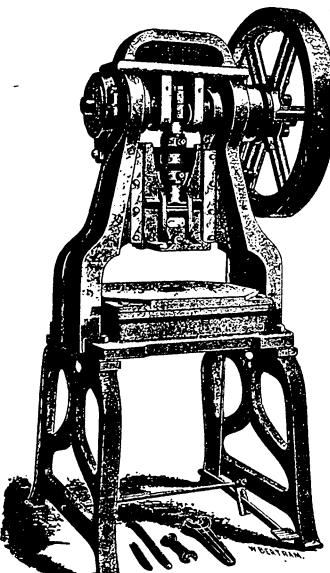
Adjustable and elastic stroke,
nicety of regulation, efficiency of
action, simplicity and durability of
construction and the absence of
leather straps, steel springs and all
complication, combine to make this
hammer the favorite wherever used.

JENKINS & LINGLE.

1213 Filbert St., Philadelphia, Pa.
Works, BELLEFONTE, PA.

POWER PRESS No. 68

ESPECIALLY DESIGNED LOW PRICED BLANKING PRESS,



for cutting can bodies or Varnish
Powder Petroleum, Lard Pails, Stove-
pipe, Elbow Sections and all kindred
articles. Is a substantial, first-class
machine in construction, material and
workmanship. Weight, complete, 3000
lbs.; opening in bed, 14 x 20 in., or as de-
sired. Can be easily adapted to other
work. For further information address

G. A CROSBY & CO.,

176 & 178 So. Clinton St., CHICAGO, ILL., U.S.A.
DESIGNERS AND BUILDERS OF

Power, Screw, Drop, Hand and Foot Presses,
Squaring and Trimming Shears and Special
Machinery for Can, Soap and Boiler Makers, and other lines of goods, including
Lanterns, Oil and Vapor Stoves, Locks, Hinges, Wire Goods, Brass Goods and all
Hardware Novelties.

Special Attention to Dies of Every Description.

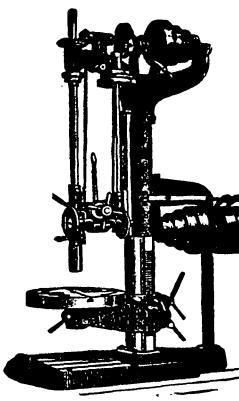
WORK GUARANTEED THE BEST.

Write for Prices and Our New 200-Page Catalogue.

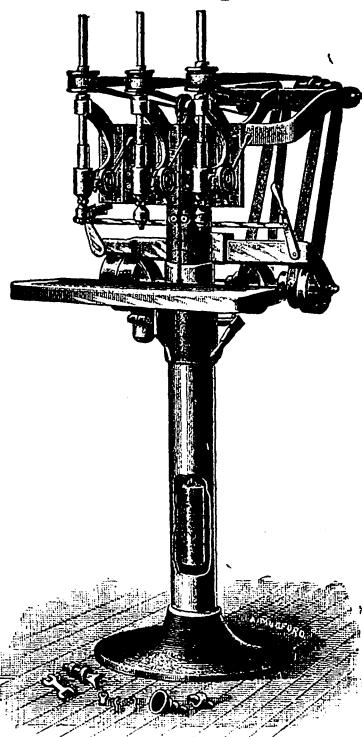
Agents for the Clark Perfection Kerosene Oil System for Heating
Soldering Apparatus.

Our Specialty:

The best, cheapest and most modern. Write us for prices before placing orders elsewhere. The Hamilton Mch'e Tool Co., Hamilton, O., (West Market St.). Western Store, 57 So. Canal St., Chicago.



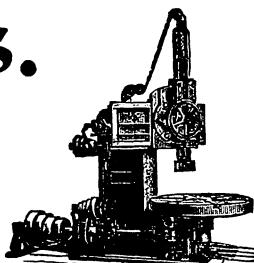
One, Two and Three Spindle Drills.



Drill Presses.

Boring Mills.

If you want prices on such or Up-right, Radial, Half and Full Universal Drills or Special Drilling Machines write



Bickford Drill & Tool Co.

10 Lawrence St., Cincinnati, O.

MACHINERY FOR STONE WORKING. LINCOLN IRON WORKS, RUTLAND, VT. New York Office, 182 Front Street

Stone Working Machinery, Planers, Gang Saws, Rubbing Beds, Derricks and Hoisting Powers, also Gear Castings. See list.

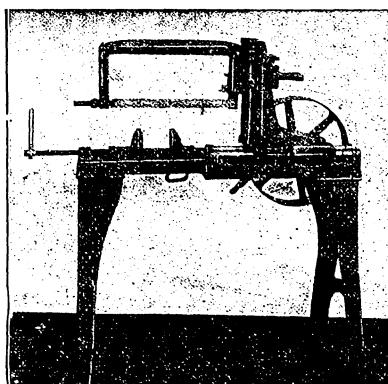
Saves its Cost in 3 Months.

Automatic Variable Feed
Horizontal Stroke
Perfect Cutting



SHOP SAW
General Offices:
703-706 W. U. Building,
Chicago, Ill.

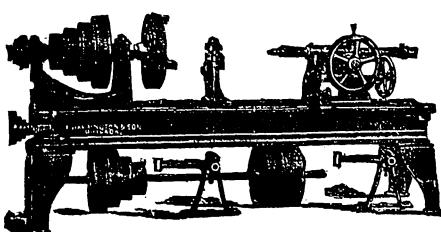
Branch Office: 29 Broadway, New York.



EDWIN HARRINGTON, SON & CO., Incorporated.

1508 PENNA. AVE., PHILADELPHIA, PA.

—: DESIGNERS AND MANUFACTURERS :—



Improved
Lathes,
Drills,
Planers.
Double Chain Hoists.

SEND FOR PRICES.

The Merrill Manufacturing Co.,

TOLEDO, O.

Manufacture

The Best

and Most

Complete

Line

of

Hand

and

Power

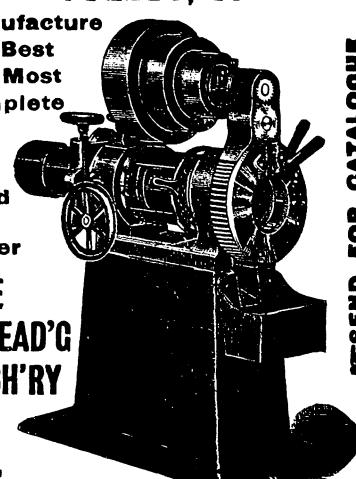
PIPE

THREAD'G

MACH'RY

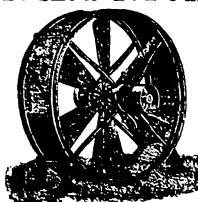
IN

USE.



SEND FOR CATALOGUE

To Show You Our Faith in Our Goods



We will wager \$1,000.00 with any fan manufacturer, that there is not another make of fan in the United States to day that will give more air with less power than required by our make of fan of the same size.

B. F. PERKINS & SON,
16 RAILROAD ST.,
Holyoke, Mass.

B. F. STURTEVANT COMPANY,

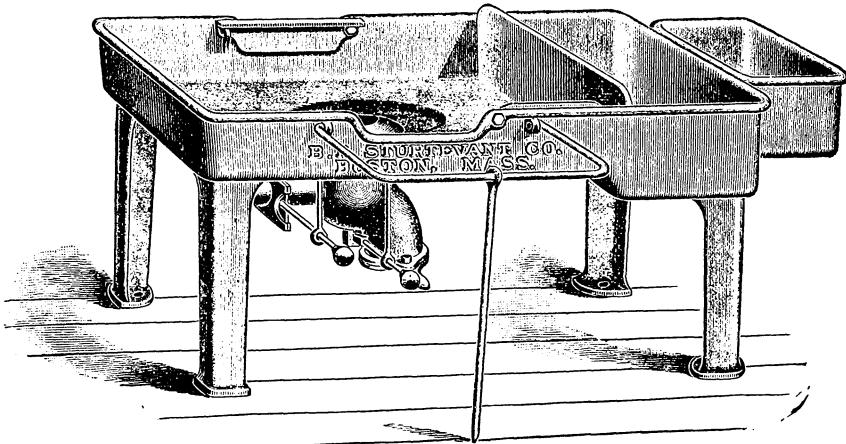
Manufacturers, Boston, Mass., U. S. A.

STYLE J1.

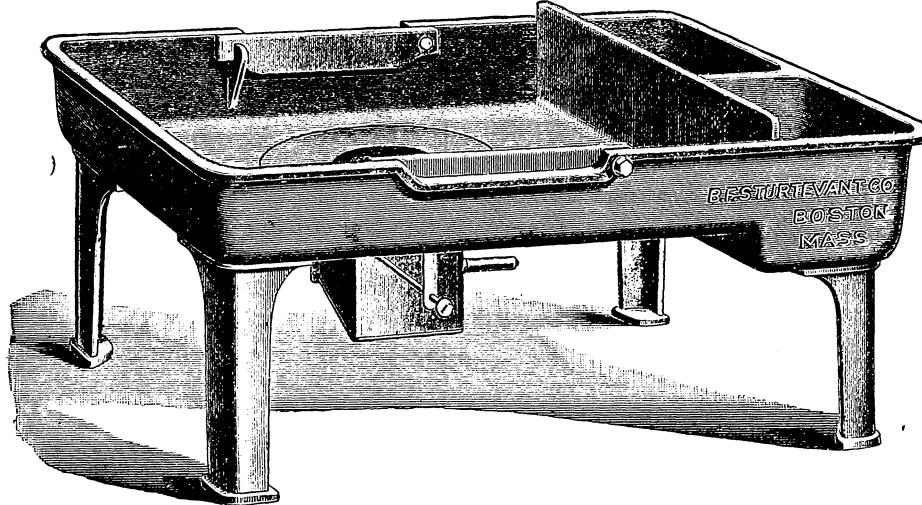
SPECIFICATIONS.

Pan, 38 in. x 49 in. x 7 in.
 Coal Box, 38 in. x 12 in. x 7 in.
 Water Box, 24 in. x 9 in. x 7 in.
 Height, 26 in.
 Weight, 450 lbs.

Cut shows Adjustable Tuyere.



Stationary Blast Forges.



STYLE J2.

SPECIFICATIONS.

Pan, 48 in. x 60 in. x 8 in.,
 Coal and Water Box
 included.
 Height, 26 in.
 Weight, 750 lbs.
 Cut shows Dumping
 Tuyere.

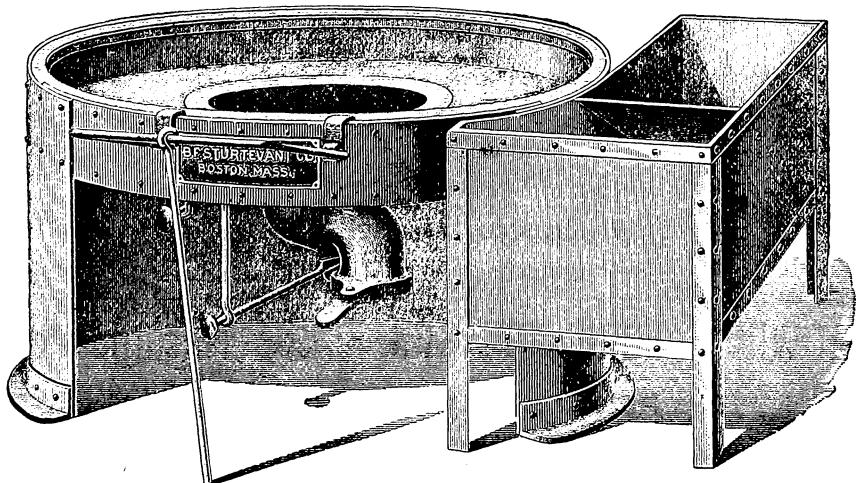
Designed for Heavy Work.

STYLE NI.

SPECIFICATIONS.

STANDARD FORCE.

Diameter, 45 inches (may be
 changed to order).
 Height, 25 in. Depth, 4 in.
 For fire 7 in. deep.
 Any kind of Tuyere fitted.



Send for 50-page Illustrated Catalogue No. 77 and Prices.

B. F. STURTEVANT COMPANY.

BRANCH STORES:

34 Oliver Street, Boston, Mass.
 91 Liberty Street, New York, N. Y.
 135 North Third Street, Philadelphia, Pa.
 16 So. Canal Street, Chicago, Ill.

75 Queen Victoria Street, London, E. C., Eng.
 21 West Nile Street, Glasgow, Scotland.
 38 Wilhelmstrasse, Berlin, Germany.
 2 Kungsholmstorg, Stockholm, Sweden.

BEMENT, MILES & CO.,

PHILADELPHIA, PA.,

MANUFACTURERS OF

METAL-WORKING MACHINE TOOLS

FOR

Railroad Shops,
Locomotive and Car Builders,
Machine Shops,
Rolling Mills,
Steam Forges,
Ship Yards,
Boiler Shops,
Bridge Works,
etc., etc.

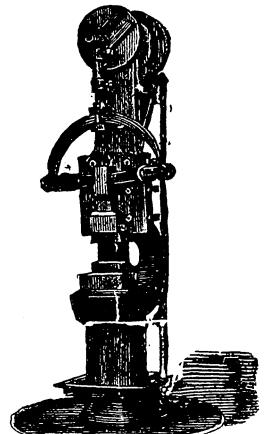
**Steam Hammers,
Steam and Hydraulic Riveting Machines.**

NEW YORK OFFICE, Taylor Building, 39 Cortlandt Street.

E. H. MUMFORD, Representative.

DEAD-STROKE POWER HAMMERS.

CONSTRUCTION IMPROVED.
Prices Reduced.
Seven Sizes
5 to 250 Pounds.



DIENELT & EISENHARDT,
MAKERS,
1310 Howard St., Philadelphia.

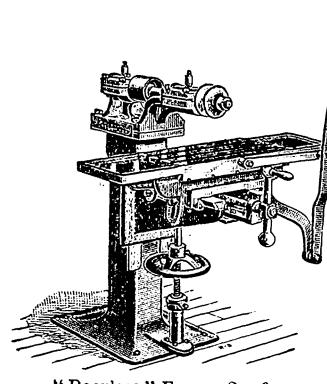
The 15 and 25 pound sizes are specially adapted
to Filmakers' use, the other sizes for general
forging. Send for circular and references.

SOMETHING NEW.**The "M. & P." Friction Drop Hammer.**

Entirely New Principle for Working the Rolls. Positive and Quick Action. Strong and Durable.

**NO BOLTS OR NUTS ON LIFTER
TO JAR LOOSE.**

Miner & Peck Mfg. Co., New Haven, Ct.



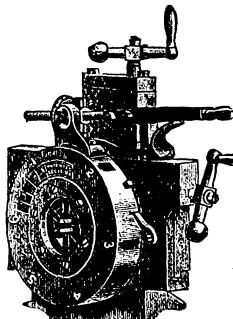
"Peerless" Emery Surfacer.

**BIGNALL & KEELER
MFG. CO.,**
ST. LOUIS, MO.
MANUFACTURERS OF
Peerless and Duplex
Pipe Threading and
Cutting Machines.

Quickest Die Adjustment. Dies changed without removing head or face plate. Unequalled in output.

Emery Surfacers, Shapers,
Combination Vises

Send for Catalogue and mention "Peerless" Head, showing
The Iron Age.



dies closed.

OFFICE OF
GILLETTE CLIPPING MACHINE COMPANY,
No. 201 East 23d Street.
G. W. Gillette, President.

NEW YORK, Oct. 5, 1894.
MESSRS. D'AMOUR & LITTLEDALE, 206 East 43d St., City.

Dear Sirs:—Some time ago we purchased one of your latest improved 12-inch Single Spindle Drill Presses and placed it beside four others of acknowledged standing and reputation. It is but faint praise on our part to concede to yours the palm of superiority in every detail of simplicity, accuracy and quality. Embodying all the essential features requisite to the attainment of best results. Wishing you every possible success, we are,

Very truly yours,

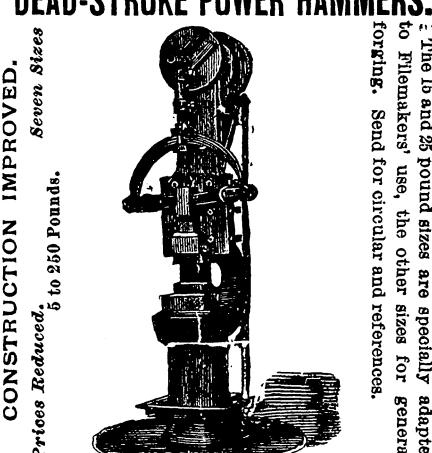
GILLETTE CLIPPING MACHINE COMPANY.

D'Amour & Littledale, 206 E. 43d St., New York.

Manufacturers of Sensitive Drills for Half Inch Holes and Less.

The WATERBURY-FARREL FOUNDRY & MACHINE CO., Waterbury, Connecticut,

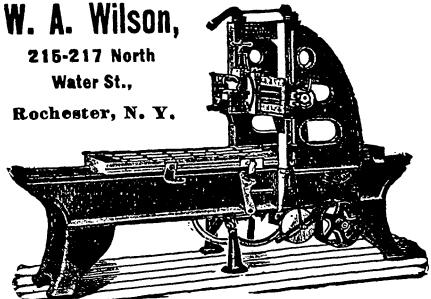
Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from Sheet Brass, Copper, Steel, Silver, &c., **POWER PRESSES**, **HYDRAULIC PRESSES**, Drop Presses, Foot Presses, **RIVET MACHINES**, Gang Slitters, Grinding Machines, Steel Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.



DIENELT & EISENHARDT,
MAKERS,
1310 Howard St., Philadelphia.

W. A. Wilson,

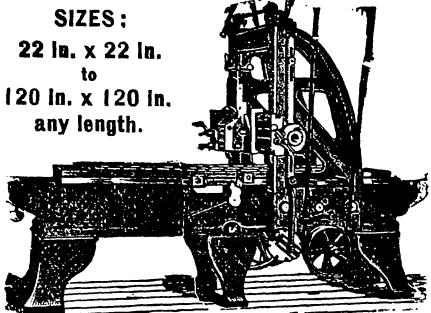
215-217 North
Water St.,
Rochester, N. Y.



Improved Iron Planers a specialty. 20 x 20, 22 x 22, 24 x 24 up to 42 x 42, to plane any length. Send for description and price-list before purchasing. Manufacturers' agent for other tools and machinery. Mention The Iron Age.

THE POWELL PLANER CO.

SIZES:
22 in. x 22 in.
to
120 in. x 120 in.
any length.

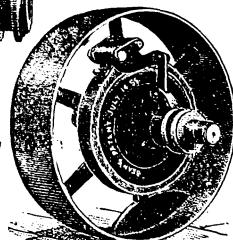
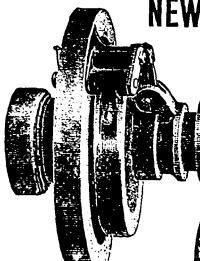


WORCESTER, MASS.

NEW HAVEN MFG. CO.,

New Haven, Conn.

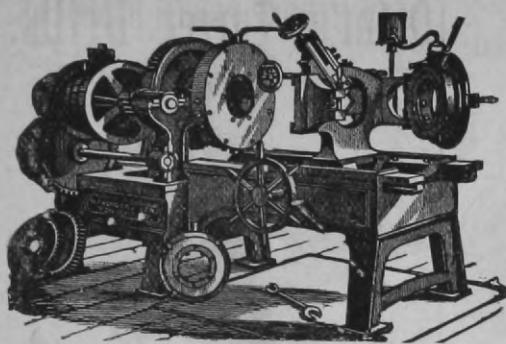
MANUFACTURERS OF

FRICITION PULLEYS

— AND —
CUT OFF
COUPLINGS.

Coal Mining for the Use of Colliery Managers and others. By HERBERT W. HUGHES. In the preparation of this work the author's aim has been to supply a text-book containing all the information with which the student and the practical miner should be familiar. The details of general colliery work are fully described, and at the end of each chapter is given a carefully selected list of memoirs in which fuller information can be sought. **CONTENTS:** Geology; Coal; Search for Coal; Breaking Ground; Shaking; Preliminary Operations; Methods of Working; Haulage; Winding; Pumping; Ventilation; Lighting; Works at Surface; Preparation of Coal for Market. 8vo, cloth. \$8.00

For sale by DAVID WILLIAMS, 96-102 Reade St. N.Y.



D. SAUNDERS' SONS,

—MANUFACTURERS OF—

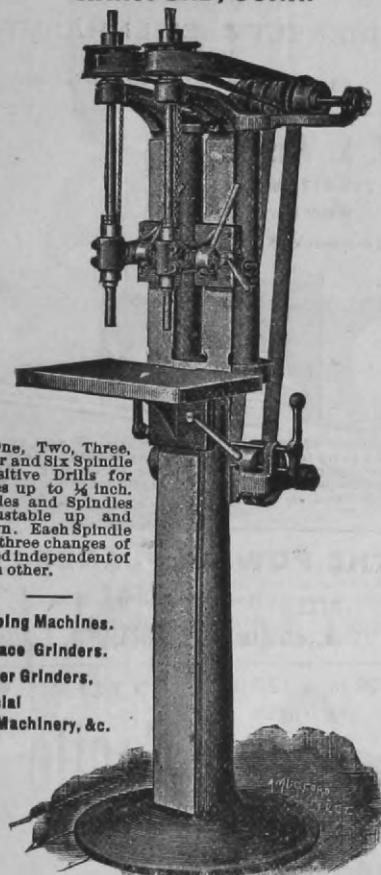
Pipe Cutting and Threading Machines

For Pipe-Mill and Steam Fitters' Use. Tapping Machines for Steam Fitting. Also Steam and Gas Fitters' Hand Tools.

SEND FOR CIRCULARS.

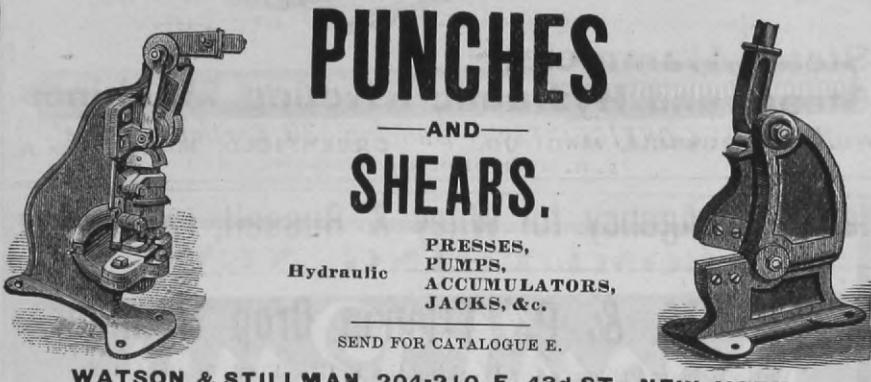
No. 25 Atherton Street, - YONKERS, N. Y.

Woodward & Rogers, HARTFORD, CONN.



One, Two, Three, Four and Six Spindle Sensitive Drills for holes up to $\frac{1}{4}$ inch. Tables and Spindles adjustable up and down. Each Spindle has three changes of speed independent of each other.

Tapping Machines, Surface Grinders, Cutter Grinders, Special Machinery, &c.



PUNCHES AND SHEARS.

Hydraulic PRESSES, PUMPS, ACCUMULATORS, JACKS, &c.

SEND FOR CATALOGUE E.

WATSON & STILLMAN, 204-210 E. 43d ST., NEW YORK.



RICHARD DUDGEON,
No. 24 Columbia St., New York,
Maker and Patentee of the Improved

HYDRAULIC JACKS

AND

PUNCHES.

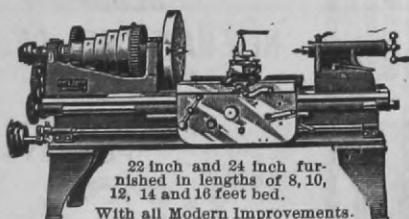
Roller Tube Expanders
and Direct Acting
Steam Hammers.

Jacks for pressing
on Car Wheels or
Crank Pins made to
order.

Communication by
letter will receive
prompt attention.

BOOKS.

YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade Street, New York.



Dietz, Schumacher & Co.,
Cincinnati, Ohio, U. S. A.

The best is the Cheapest. We make the best.

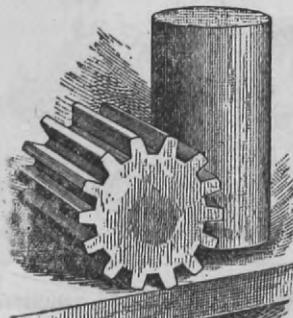
Radial Drills.

Eng. Lathes.

In the many places where odd shapes of unusual strength are required, or where high velocity is necessary, our

Hydraulic Forgings

are the most reliable and efficient of all materials. Detail information promptly furnished upon request.



Billet and Patent Hot-Pressed Steel Pinion.

~SPECIALTIES.~

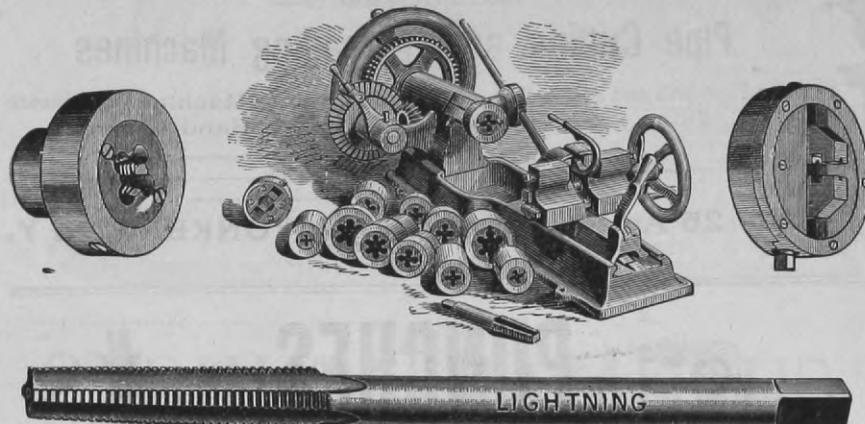
STEEL BOTTLES—Air and Gas Receivers drawn from the solid STEEL TUBING, for Bicycles, High Pressure Boilers, Sleeves, Ferrules, Bushings, Collars, etc.

STEEL PINIONS AND TROLLEY POLES for Electric and Elevator Service, etc.

Correspondence Solicited.

THE U. S. PROJECTILE CO.,
1st Ave. and 53d St., BROOKLYN, N. Y.

Finest Bolt-Cutting and Nut-Tapping Machines.
 "Lightning" and "Green River" Screw Plates, Taps, Dies, Reamers, Etc., Etc.
 SEND FOR 168 PAGE CATALOGUE.



WILEY & RUSSELL MFG. CO., - GREENFIELD, MASS., U.S.A.

New York Agency for Wiley & Russell, 120 Liberty St.

Don't Buy

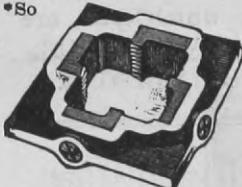
***Maule's "Skeleton" Pipe Die**

If You Wish to Avoid

A Pipe-Threading Die extremely easy of operation by reason of the proper clearance of its cutters;
Of surpassing durability secured by the accurate and uniform temper of said Cutters;
Having Cutters that when dull may be removed in a moment, and sharpened on a grindstone or emery wheel;
Of phenomenal cheapness, arising from small first cost coupled to excellence of quality.

If by chance you do not think these points, or the saving of money, objectionable,

*So



Send us a Postal Note for 62 Cents (do not send us any postage stamps), and we will mail you a sample one-inch Die, either $2\frac{3}{8}$ or $2\frac{1}{2} \times \frac{3}{4}$ thick, which we hereby agree to take back if not to your satisfaction.

**HENRY B. PANCOAST & CO.,
PHILADELPHIA, U.S.A.**

Send for Catalogue of the "Skeleton" Pipe Die

JARECKI MFG. CO. (Limited), Erie, Pa.

PIPE THREADING AND CUTTING TOOLS OF ALL DESCRIPTIONS.

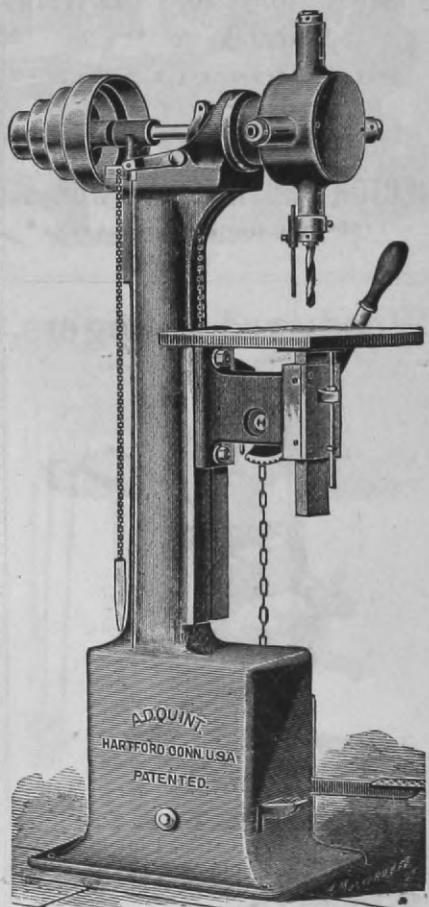


Write for Catalogue showing the most complete line of $\frac{1}{4}$ -inch to 16-inch for hand, belt, engine and with electric motor attachment.

We can furnish Bolt Threading Attachment for this Machine.

Quint's Turret Drills.

No. 2 Pattern.



This machine is made with from 2 to 12 spindles. All spindles driven direct by bevel gears. Only the spindle in use revolves. Will drill up to $\frac{1}{4}$ inch.

Address **A. D. QUINT, Hartford, Conn.**

**THE
"Facile"
SINGLE
CHAIN
BLOCK.**

We claim this block to excel in:
 Ease with which the load is raised.
 Low ratio of speed in hand chain.
 Perfect control of load at all points.
 Quick lowering when desired, by "spinning" the hand chain.
 Fewer parts and less wear than other single chain blocks.
 Can be worked at any angle.
 Requires less head room.
 One man raises upwards of 1 ton.
 For sizes and prices apply to

**Jos. F. McCoy Co.,
26 Warren Street,
NEW YORK.**

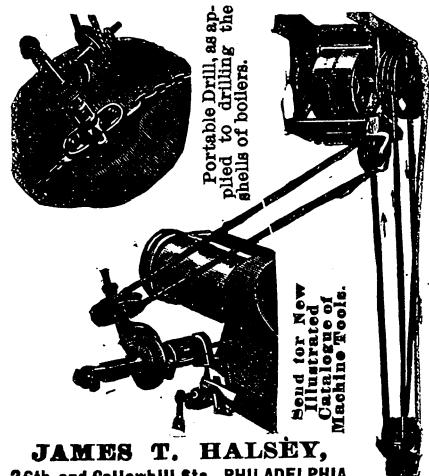
Mechanics.—The Technical Student's Introduction to. Being a series of Practical Papers showing the leading Principles of Physical Science, Exemplified in the Properties of Bodies or Materials; the laws which Regulate the Phenomena of Motion, of Heat, of the Atmosphere, of Water at Rest and in Motion, etc., etc., as applied to the Practical Work of the Architect and Builder, the Engineer and Machinist, and the General Artisan engaged in the Designing and Construction of Machines, Tools, and Appliances Useful in the Industrial Arts. By Various Writers. Edited by Robert Scott Burn. About 150 Illustrations. \$2.00
 For sale by David Williams, 96-102 Reade St., N.Y.

**FRICITION CLUTCHES, SHAFTING,
HANGERS, PULLEYS.**

Sheaves for Rope Driving.
Gear Wheels.

FRICITION PULLEYS.

**KEYSTONE
CLUTCH AND MACHINE WORKS,**
1708-1710 Germantown Ave.,
PHILADELPHIA, PA.



JAMES T. HALSEY,
26th and Callowhill Sts., PHILADELPHIA.

WE LEAD.

Sweetland Combination Chucks. Simple, accurate, original. Standard Independent Chucks, Solid Shell, Solid Reversible Jaws.



The Hoggson & Pettis Mfg. Co.,
New Haven, Ct.

SKINNER PATENT CHUCKS.

Independent Lathe Chucks.
Universal Lathe Chucks.
Combination Lathe Chucks
Lathe Chucks with Patent
Reversible Jaws. Planer
Chucks, Drill Chucks, Face
Plate Jaws, &c.
THE SKINNER CHUCK CO.
New Britain, Conn., U. S. A.

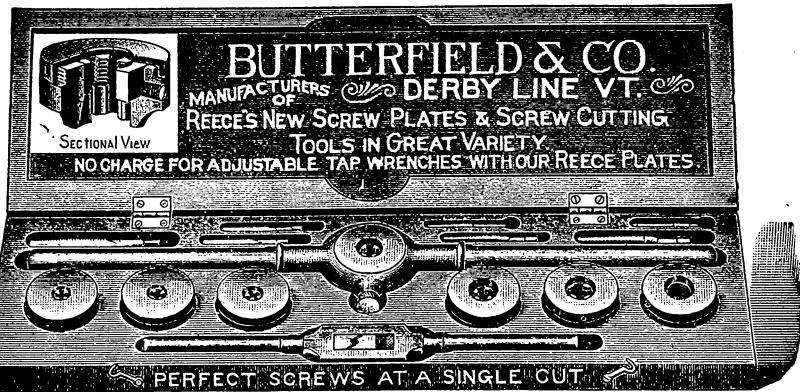


CHUCKS The National
All sizes and
styles. Patented
Reversible Jaws. Illus. catalogue.
The standard Chuck since 1882.
Address W. WHITLOCK,
39 Cortlandt Street, New York.

**HARDWARE
MACHINERY,
PAPER BOX
MACHINERY,
MATCH
MACHINERY.**

SEND FOR CATALOGUE.

HERRICK & COWELL,
36 ARTIZAN ST.,
NEW HAVEN, - CONN.



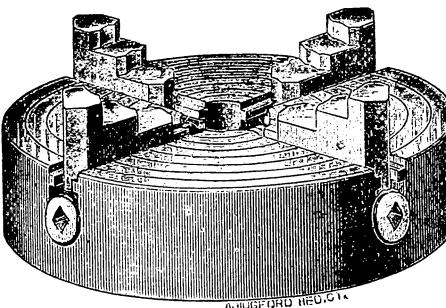
"CUSHMAN" CHUCKS.

For Lathes, Drills, Chucking and Screw Machines, and for special use.

SEND FOR CATALOGUE.

**The Cushman Chuck Co.,
Hartford, Conn.**

CHAMPION INDEPENDENT CHUCKS.



An entirely new line of small Chucks, provided with 3 or 4 independent reversible steel jaws. The best Chuck in the market for foot lathes. Ask your dealer for them or write to us.

THE D. E. WHITON MACHINE CO.

New London, Conn.



Three styles of Screw Plates BUILT ENTIRELY ON HONOR, with prices to suit all. Write for catalogue.

CHAMPION BLOWER & FORGE CO., - - - LANCASTER, PA.

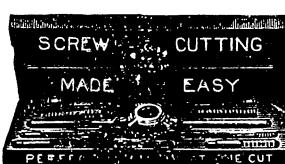


**THE DUPLEX,
Best on Earth.**

30,000 in Daily Use.

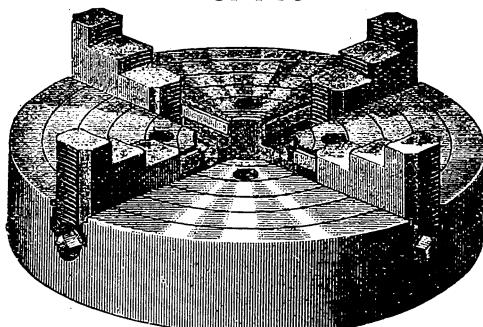
HART MANUFACTURING CO.,

CLEVELAND, O., U. S. A.



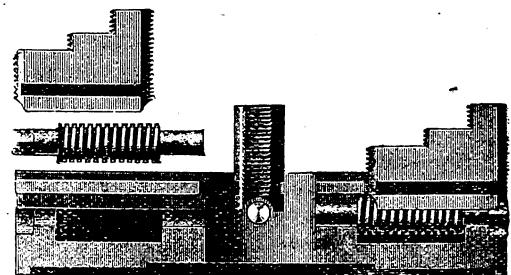
IMPROVED INDEPENDENT LATHE CHUCK.

No. 18.



DIAMETER.	PRICE.
4 Inch Chuck, Four Jaw,	\$14.00
6 "	18.00
8 "	22.00
10 "	26.00
12 "	30.00
14 "	34.00
15 "	35.00
16 "	38.00
18 "	44.00
20 "	50.00
22 "	57.00
24 "	65.00
30 "	120.00
36 "	210.00

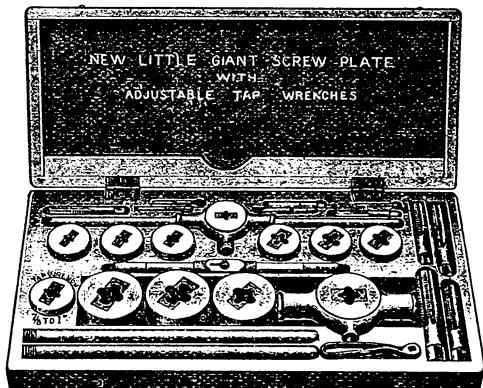
Jaws Reversible.



UNION MANUFACTURING CO. New Britain, Conn.

Warehouse, 103 Chambers Street, New York City.

WELLS BROS. & CO.,

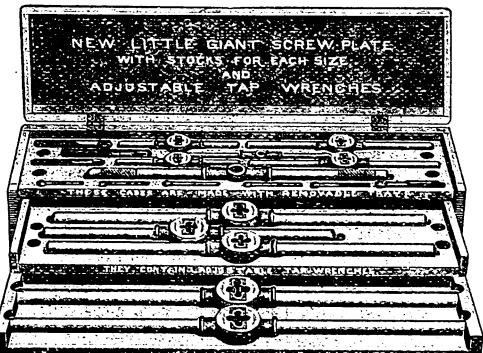
GREENFIELD,
MASS., U. S. A.,

MANUFACTURERS OF
THE CELEBRATED
"LITTLE GIANT"
SCREW PLATES.

In great variety. Cutting all sizes from the smallest bicycle rod to one and one-half inch diameter bolts.

ALSO MANUFACTURERS OF

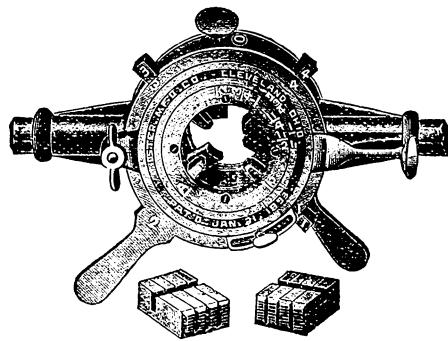
Blacksmiths' Carriage-Makers', Machinists' and Amateurs'



SEND FOR OUR FULL ILLUSTRATED CATALOGUE.

Labor-Saving Tools AND Machinery.

The Latest and Best



The Oster Patent Adjustable Die Stocks.
with Patent Adjustable Positive Stop
and Cut-Off,

Are built, sold and warranted as the best hand tools for threading and cutting off pipe.

They are complete in themselves; no hammer, wrench or other tools required. They are easier to operate, have less weight, more strength and do a larger range of work and more of it in a given time than any in the market.

They have all the merits of perfect tools in material, construction and finish. They are furnished at popular prices by whole-sale dealers throughout the world. Boxed singly with full printed instructions.

Write for Prices and Discounts to

The Oster Mfg. Co.,
CLEVELAND, OHIO, U. S. A.

Wire Drawing Machines, WATERBURY
Gang Slitters,
Power Presses and Dies,

Tumbling Barrels,
Special Machinery.

Waterbury, Conn.

MANUFACTURERS.

Send For Prices.



ARMSTRONG MFG. CO.
JEWELERS' AND
WATCHMAKERS' TOOLS
WATER GAS AND
BRIDGEPORT, CONN. STEAM TOOLS
OUR ADJUSTABLE STOCKS and DIES
are universally acknowledged to be the BEST! We
also make all our Tools on the same principle of the
Best Material and Workmanship, and always
with a view of time and labor saving in their use.

A "DANDY" for a side line for drummers in all lines from fish hooks to corsets. Get on to it.



Challenge Family
Grinder and Polisher
Grinds everything, from
CARVERS to NEEDLES,
perfectly; Polishes everything
in use. Fits any Sewing
Machine. Price, \$1.00.
Postage, 15c.
AGENTS WANTED.
APPLETON MFG. CO., PHILA.

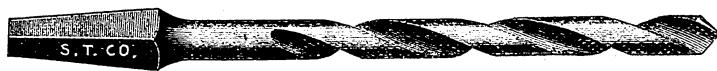
Electric Toy Making, Dynamo Building and Electric-Motor Construction. By T. O'CONOR SLOANE, A.M., E.M., Ph.D. This work treats of the making at home of electrical toys, electrical apparatus, motors, dynamos, and instruments in general and is designed to bring within the reach of young and old the manufacture of genuine and useful electrical appliances. The work is specially designed for amateurs and young folks. Very fully illustrated..... \$1.00
For sale by David Williams, 96-102 Reade St., N. Y.

THE STANDARD TOOL CO.,

Factory, Cleveland, Ohio.
New York Office, 33 Chambers St.

INCREASE TWIST DRILLS, REAMERS, TAPS, MILLING CUTTERS AND CHUCKS.

Taper Shank
Drills,
St. Shank Drills,
Screw Driver Bits,
Reamers,
Shell and solid
Taper Reamers,
Spring Cotters and
Flat Spring Keys.



BIT STOCK DRILLS FOR METAL OR WOOD with solid shanks.



STRAIGHT SHANK DRILLS FOR METAL.
SEND FOR CATALOGUE.

Hand Taps,
Mach. Screw Taps,
"Standard" Drill
Chucks,
Emery Wheel
Dressers,
Sq. Shank Drills for
Ratchets,
Twist Drills for
Blacksmiths'
Presses.

1874.

OLD RELIABLE.

1894.

SEND

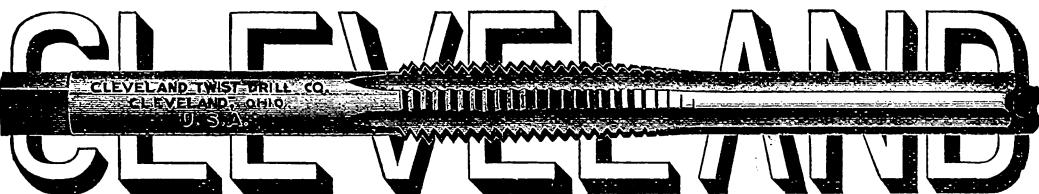
FOR

CATALOGUE.

WRITE

FOR

DISCOUNTS.



Our Drills are Hot Forged. The best part of the steel IS NOT CUT OUT and thrown away.

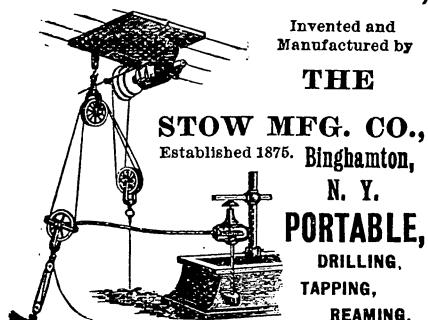
NEW PROCESS

TWIST DRILL COMPANY.

MASS.
TAUNTON

They are TOUGHER, STRONGER, BETTER than is possible to attain by milling. Catalogue and Discounts sent on application.

STOW FLEXIBLE SHAFT,



Invented and
Manufactured by

THE

STOW MFG. CO.,
Established 1875. Binghamton,
N. Y.
PORTABLE,
DRILLING,
TAPPING,
REAMING.

General European Agents,
SELIG SONNENTHAL & CO.,
85 Queen Victoria St.,
LONDON, ENGLAND

MORSE TWIST DRILL & MCH. CO.,



DRILLS, REAMERS, CUTTERS,



BEACH CHUCKS, TAPS, DIES.

Factory, NEW BEDFORD, MASS.

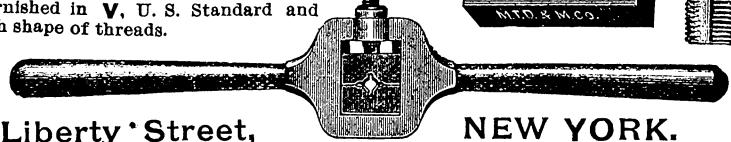
Catalogues on application.

MANNING, MAXWELL & MOORE.

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO'S



Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers; also of Solid Bolt and Pipe Dies. Furnished in V, U. S. Standard and Whitworth shape of threads.



NEW YORK.

Stow Flexible Shaft Co., Limited,

6th, Callowhill & Biddle Sts.,

PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,
TAPPING, REAMING,
and BORING MACHINE
Also Tools for Emery Wheel
Grinding, Metal and Wood Pol-
ishing, Cattle Brushing and
Clipping, &c.

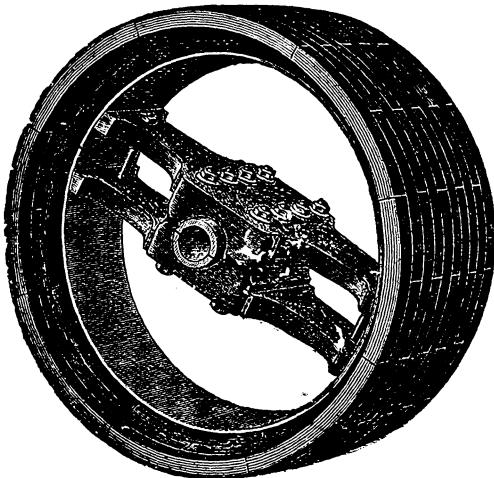
Gen'l European
Agents,
Boring & Lowe,
2 Lawrence
Pountney Hill,
LONDON, ENGL.

Drop Forged of Steel.

This Will Give You an Idea
Of how these tools gain in favor after being once
tried:
From WALTER SCOTT & CO.,
Plainfield, N. J.
June 22, 1894.—Please send us for trial
one No. 1 and one No. 3 tool holders.
Sept. 17, 1894.—Sample tool holders very
satisfactory. You may send us at once 5¢ No.
1, 30 No. 2, 18 No. 3 and 15 No. 5 Tool Holders. Drop
For Circulars and Prices send to Armstrong
Bros. Tool Co., 78 Edgewood Ave., Chicago, Ill.

Lathe and
Planer
Tool.

Pat. Feb. 28,
1893.



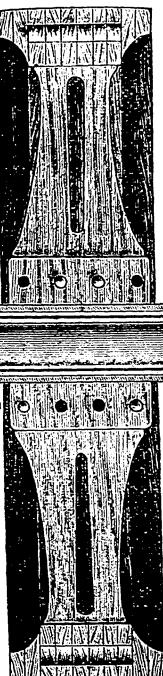
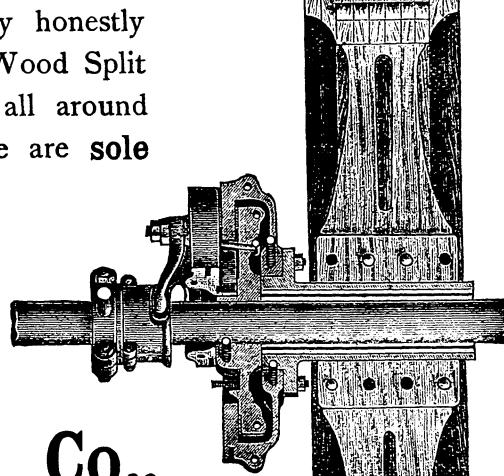
service. So simple any one can adjust to shaft. We are **sole Manufacturers** and **have no licensees**.

Sales agencies all over the world. Send for list. Also manufacture Self-Oiling Hangers, Shafting, Split Friction Clutches, Iron Rope Sheaves and full line of Power Transmission Appliances.

Use only the Strictly High Grade Dodge Patent
WOOD SPLIT PULLEY,
WITH PATENT STANDARDIZED BUSHING SYSTEM.

Built for work, not ornament. We make but one grade—that the best. Our bushings are bored and turned from solid wood.

We claim the only honestly made and first-class Wood Split Pulley, suitable for all around



Dodge Manufacturing Co.,

Works, MISHAWAKA, IND.

BRANCHES WITH LARGE STOCKS:

Chicago, 166-174 So. Clinton St.

New York, 43-45 Dey St

Boston, 187-189 Purchase St.

(ESTABLISHED 1854.)

A. & F. BROWN,
Engineers, Founders and Machinists.
SHAFTING,
PULLEYS, HANGERS, ETC.

FRICITION CLUTCHES.

Estimates and Plans furnished for transmitting power by
HORIZONTAL AND VERTICAL SHAFTING

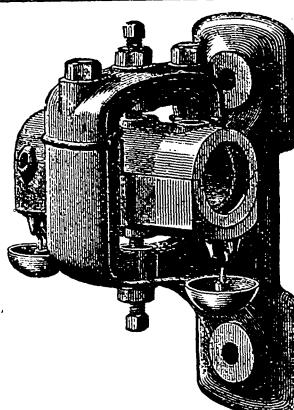
Also for erecting same.

STEAM SIRENS

—FOR—

Lighthouse, Steamship, Factory and Fire Signals.
SEND FOR CATALOGUE.

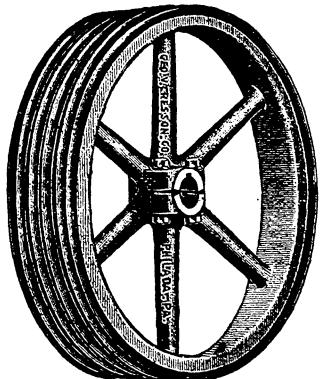
17 DEY ST., - - - NEW YORK.



GEO. V. CRESSON CO.,

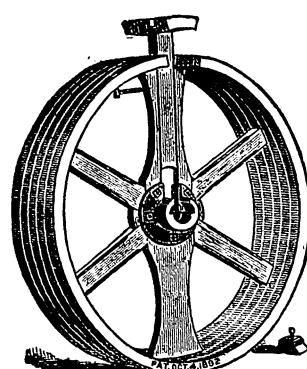
18th STREET AND ALLEGHENY AVE.

PHILADELPHIA, PA.



ROPE WHEELS,

All Diameters and Number of
Grooves, for Manilla, Hemp;
Cotton, or Leather Ropes.



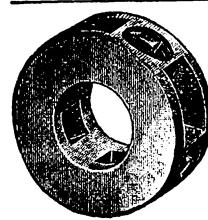
THE Reading Wood Pulley

Is a strictly high grade Pulley, with bored iron hub, which has a perfect grip on shaft and gives universal satisfaction.

Our large stock is at your service.
Write for price-list and discount.

AGENTS WANTED.

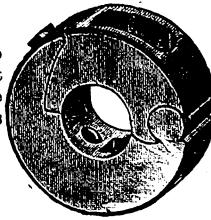
READING WOOD PULLEY CO.,
READING, PA., U. S. A.



A SPLIT COLLAR

that may be put upon a shaft in a space equal to its length, and that has no projecting Bolts or Set Screw Heads is the correct thing. That is the kind our "GIANT" is. Price list and discounts on application.

THE GOUVERNEUR MACHINE CO.,
Gouverneur, N.Y.

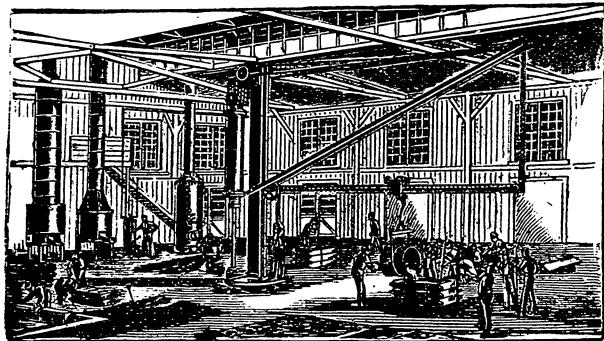


**PAPER MACHINERY
FRICTION CLUTCHES**

THE MOORE & WHITE CO.
15TH & LEHIGH AVENUE.

PUT UP (CRANES) OR SHUT UP (SHOP).

That day has gone by when you can hope to do a profitable business and lug stuff around by hand or with slow moving cranes. You surely must have noticed that the best concerns all over the land are putting in the Simple, Cheap and Rapid Ridgway Steam Hydraulic System of Cranes. The most perfect Hydraulic System, yet requiring neither pumps nor accumulator. That costs nothing to run it. That does the work **INSTANTLY**. Well, when you come to compete with these concerns they will beat you out of your boots! People who put in these cranes are simply amazed at the saving they make. They expected some saving, of course, but they had no idea a crane could be so magnificent—they had been used to the usual sort of cranes. We are always ready to furnish cranes and take for our pay one-half what they save in wages in a specified time.



Here is the sort of letters we are constantly getting :

BUFFALO, N. Y., August 28, 1894.

CRAIG RIDGWAY & SON, Coatesville, Pa.

DEAR SIRS:

* * * * * Your cranes have worked Splendid and have given us entire satisfaction. We would not trade them for anything we have ever seen.

BUFFALO CAST IRON PIPE CO.,

HENRY HENDERSON, Supt.

Many styles and modications to suit every kind of place, to do work Quickly and Cheaply. Also Elevators and Stock Hoists worked by Steam-Hydraulic.

Our new Circular is worth having.

CRAIG RIDGWAY & SON,

Coatesville, Pa.

SELL THE BEST.



**THE "SURE GRIP"
Steel Tackle Block**

is taking the place of all other hoisting blocks.

Send for catalogue and discount.

Fulton Iron & Engine Works
28 Brush St., Detroit, Mich.

ESTABLISHED 1852.

—OR—

Rice Lewis & Son, Ltd.,
TORONTO, CAN.

TRIPLEX

Spur Gear.

DUPLEX

Convertible.

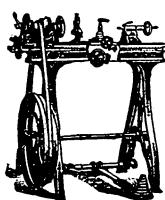
DIRECT

Differential.

HIGHEST EFFICIENCY.
The Yale & Towne Mfg. Co.
STAMFORD, CONN.
New York, 84-86 Chambers St.
Chicago, 152-154 Wabash Ave.
Philadelphia, 1120 Market St.
Boston, 224 Franklin St.
Pittsburgh, Times Bldg.
San Francisco, Mills Bldg.

The Metallurgy of Lead and the Desilverization of Base Bullion. By H. O. HOFMAN, E.M. Ph.D., Associate Professor of Mining and Metallurgy Massachusetts Institute of Technology. This work will be found indispensable to every one connected with the lead industry or with general metallurgy. Cloth.....\$6.00

For sale by David Williams, 96-102 Reade St., N. Y.



Foot & Hand Power Machinery,

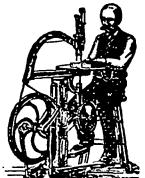
Screw Cutting Lathes, Wood Turning Lathes, Scroll Saws, Circular Saws, Moulder, Mortisers, Etc.

Strictly High Grade.

Catalogue Free.

SENECA FALLS MFG. CO.,
255 Water St., Seneca Falls, N. Y., U. S. A.

London Agency, MESSRS. CHAS. CHURCHILL & CO., 21 Cross St., Finsbury, London, E. C., England.



LATHES.

ISRAEL H. JOHNSON, JR., & CO., - PHILADELPHIA.

LATHES,
MODERN DESIGNS. CAT. FREE.

PLANERS, SHAPERS, DRILLS, TOOLS

Workmanship, Material, &c., Best. Prices Low.

SEBASTIAN LATHE CO.,
113 & 115 Calvert St.,
CINCINNATI, O.

Penn Elevator Engineering Co., ELEVATORS

WORKS :
BLOOMSBURG, PA.

MANUFACTURERS
AND BUILDERS

PHILADELPHIA
OFFICE :
516 COMMERCE ST.

Hydraulic and Direct Electric Passenger and Freight Elevators.
Steam, Belt and Hand Power Elevators of every description,
With Automatic Doors or Gates.

EVATORS.

Hydraulic,
Steam,
Electric and Hand,
for Passenger and

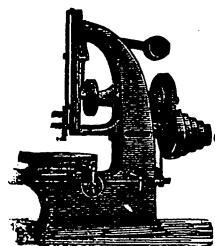
FREIGHT.

Any Carpenter can put them up.
And any Hardware Dealer can make a splendid profit selling them.

We also make a full line of Dumb Waiters and Lifts.

The Warner Elevator
Mfg. Co.,

BRIGHTON STATION, CINCINNATI, O.



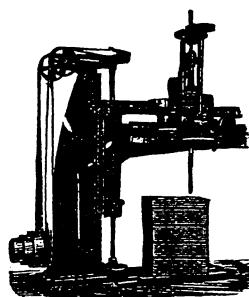
William Sellers & Co., Inc.

PHILADELPHIA, PA.,

—MANUFACTURERS OF—

Improved Machine Tools for Working Iron and Steel,
High Speed Power Traveling and Swing Cranes,
Injectors, Locomotive Turn Tables, Shafting, &c., &c.
Testing Machines, under patents of A. H. Emery.

Prices, Descriptive Matter, &c., Furnished on Application.





CRANES

MARIS & BEEKLEY,
2343-45 Callowhill St.,
PHILADELPHIA.

Power Bridge
Cranes,
Hand Bridge
Cranes,
Jib Cranes.

OPEN SIDE PLANERS.

READY FOR IMMEDIATE DELIVERY.

SPECIAL MACHINERY.

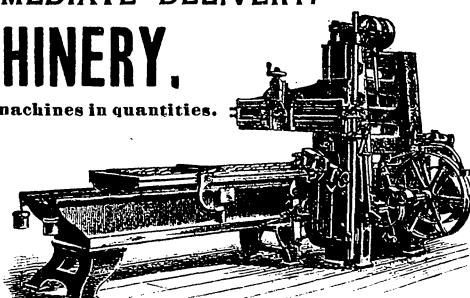
We will take pleasure in estimating on machines in quantities.

DETTRICK & HARVEY

MACHINE CO.,

MANUFACTURERS,

BALTIMORE, . . . MD.



MORSE,

WILLIAMS

& CO.

Morse Elevator Works.

MANUFACTURERS AND BUILDERS OF

ELECTRIC, HYDRAULIC, BELT and HAND
POWER PASSENGER and FREIGHT

ELEVATORS.

1105 Frankford Ave., Philadelphia. 108 Liberty St., New York.
1116 E. St., N. W., Washington, D. C. 33 Lincoln St., Boston.
425 Spruce St., Scranton, Pa. 82 Church St., New Haven.
Omaha Building, Chicago, Ill.

FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

Twenty-second and Wood Sts., Philadelphia, Pa.
Shafting, Gearing, Self-Oiling Bearings, Friction Pulleys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manila and Cotton Rope Driving. Looms, Cotton and Woolen Machinery for Winding, Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring &c.



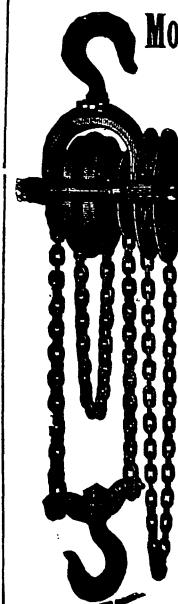
SPEIDEL & ROEPER,
807 & 809 Cherry Street,
READING, PA.

Manufacturers of Speidel's Patent
Economic Safety Hoists,
500 to 30,000 lbs. capacity.

Have been awarded the "John Scott
Medal and Premium" by the Franklin
Institute of the City of Philadelphia, also Medal and Diploma by
the World's Columbian Exposition,
at Chicago, for Highest Efficiency,
Simplicity and Durability.

With our hoist one man can lift two
or three times as fast as with any other
hoist, it has two speeds, and is guaranteed
to give satisfaction. Traveling and Swing Cranes up to 30,000
lbs. capacity and 50 ft. span. Overhead
Tramway, Trolleys, Switches and Special Hoisting
Machinery.

Self-contained Elevators and Dumb
waiters. Illustrated catalogue and
prices on application.



Moore Mfg. & Fdry. Co.,

Milwaukee, Wis., U. S. A.,

Manufacturers of

Moore's Anti-Friction

Differential

Chain

Pulley

Block.

A New Movement!
A Perpetual Compound Lever!

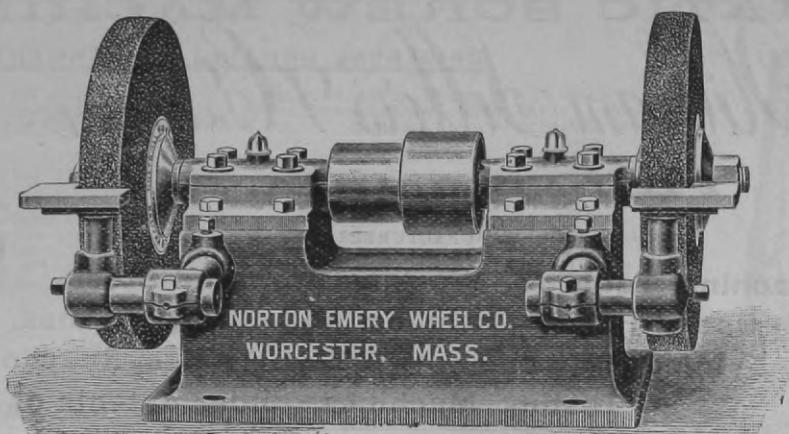
Powerful, Simple and Durable!

One Man Can Lift to the Full Capacity of the Block.

Self-Sustaining at Any Point.

The Block Always Hangs Plumb.

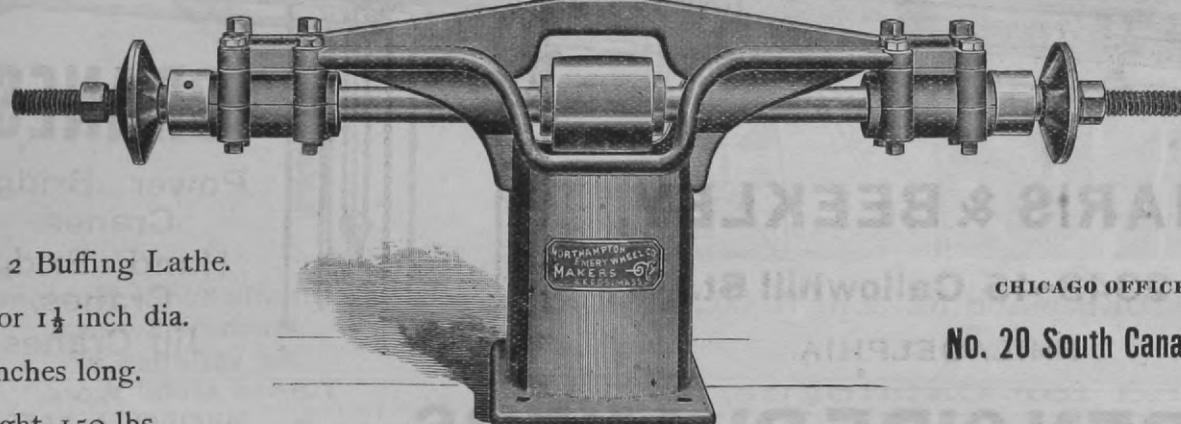
Send for descriptive price list
mentioning this paper.



NORTON EMERY WHEEL CO.
WORCESTER, MASS.

COMPLETE ILLUSTRATED CATALOGUE FURNISHED FREE.

NORTHAMPTON EMERY WHEEL CO., Leeds, Mass.



No. 2 Buffing Lathe.

Arbor $1\frac{1}{2}$ inch dia.

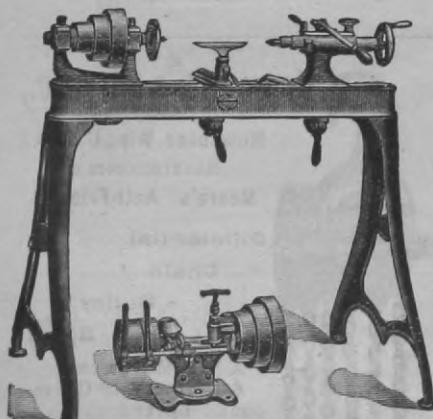
48 inches long.

Weight, 150 lbs.

CHICAGO OFFICE,

No. 20 South Canal St.

Lever and Screw
Feed Lathes, 10, 13
and 16 inch swing.
Furnished with Chuck,
Turret Head, Back
Rest and Double Cut
off Tool.



DIAMOND MACHINE CO., Providence, R. I.

Practical Hints on Joint Wiping, For Beginners In Plumbing. This book contains a reprint from *The Metal Worker* of two articles on the method of Joint Wiping, an operation calling for a very large degree of manual skill. It is illustrated from photographs representing the hands and tools when wiping joints in various positions, and gives all the assistance that description of the work can furnish. With thirty-five illustrations, 48 pages, paper, \$0.25

For Sale by David Williams, 96-102 Reade St., N. Y.



THE Bennett Emery Wheel Dresser

Does the best work, does it easy, quick and the most for the least money. Manufactured by Bay State Stamping Co., 17 Hermon Street, Worcester, Mass.

The Best On Earth.
THAT IS WHAT THEY ALL SAY OF
BEREa GRINDSTONE

Of which we are the sole manufacturers.

Send for prices and our Catalogue C, showing Mounted Grindstones, Scythe Stones, &c.

The Cleveland Stone Co.,
CLEVELAND, O.

Sterling Emery Wheel Company, 174 Fulton St., N. Y.
FACTORIES:
Tiffin, Ohio, and West Sterling, Mass.



Wood Split Pulley.

Strongest,
Lightest,
Simplest,
Cheapest



REEVES PULLEY CO.,
1220 E. 7th Street, COLUMBUS, IND.
New York Agents,
Patterson, Gottfried & Hunter, 146-150 Centre St.

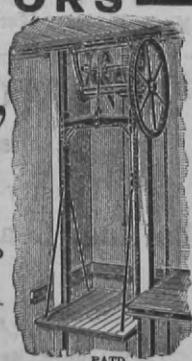
ELEVATORS —

Hand and Belt
Power.

'VARIETY'
HAND ELEVATOR

HAAS
AUTOMATIC CLUTCH,
ROLLER BEARINGS,
MACHINERY FASTENED
TOGETHER IN IRON
FRAME.

Prices on any machine fur-
nished on application to
Variety Machine Co.,
WARSAW, N. Y.



AUTOMATIC SCREW MACHINERY.

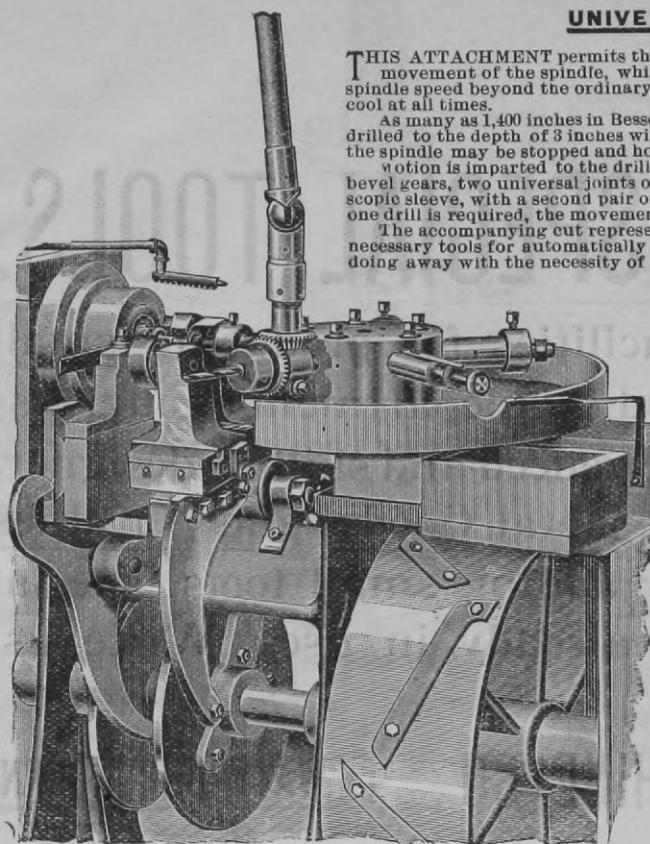
UNIVERSAL DRILLING ATTACHMENT.

THIS ATTACHMENT permits the drill to be run at any desired speed in the opposite direction to the movement of the spindle, which insures perfect alignment and rapid cutting without increasing the spindle speed beyond the ordinary limit. The oil is carried to the point of the drill, keeping the latter cool at all times.

As many as 1,400 inches in Bessemer steel have been drilled without re-sharpening, each hole being drilled to the depth of 3 inches without retracting. This device is simple and durable, and when desired the spindle may be stopped and holes readily drilled in any position from the center outward.

Motion is imparted to the drill or drills direct from the countershaft by means of a yoke, a pair of bevel gears, two universal joints of simple and durable construction, an intermediate shaft, and a telescopic sleeve, with a second pair of gears mounted on a fixture carrying the drill holder. If more than one drill is required, the movement is imparted by a bevel gear located at the center of the turret.

The accompanying cut represents this device in connection with a special oscillating fixture and the necessary tools for automatically producing bicycle-wheel hubs and kindred work directly from the bar, doing away with the necessity of forgings or other blanks.



HARTFORD MACHINE SCREW CO.,

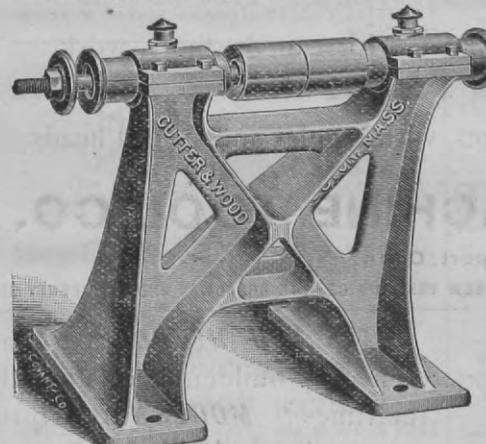
Hartford, Ct.

Send for Catalogue.

CUTTER, WOOD & STEVENS, 131 Pearl St., BOSTON, MASS., U. S. A.,

—MANUFACTURERS OF—
EMERY WHEEL and POLISHING and BUFFING MACHINERY.

SEND FOR 1894 CATALOGUE.

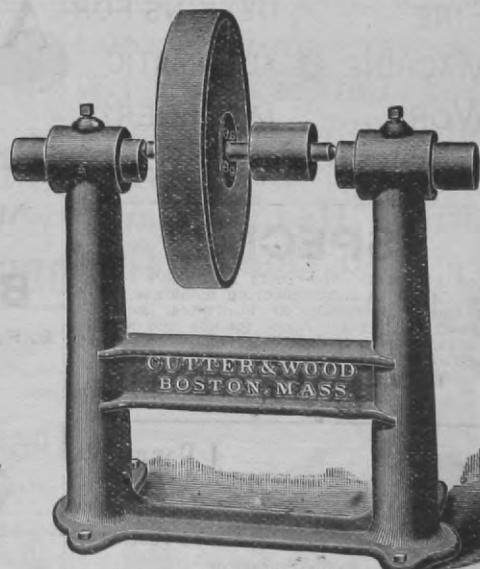


Offset Polishing and Buffing Machine.

Emery.
Emery Wheels,
Emery Dressers,
Emery Cloth,
Emery Belts,
Emery Glue.
Polishing Wheels of all kinds.
Cloth and Felt Buffs all kinds.
Polishers' and Platers' Brushes.
Tripoli Compositions.
Crocus Compositions.
Rouges, Pumice.
Walrus, Bull-neck and Oak
Tanned Leather.
Lace Leather.
Plating Dynamos and Outfits
Complete.
Nickel Salts.
Nickel Anodes.
Plating Solutions.
Banner Lye.
Cyanide Potassium.
Lacquers.
Files, Drills, Wires, Taps, Dies,
Wrenches and

Machinists', Polishers'

and Platers' Supplies.



Cupola Polishing Machine.



AUTOMATIC DOUBLE GLUE JOINTER.

Makes two glue joints at one operation.

Highest Honors, Antwerp, 1894.

Highest Honors, World's Fair Chicago, 1893.

THE
EGAN CO.,

179 to 199 W.
Front St.,
CINCINNATI,
OHIO, U. S. A.
Introducers and
Constructors.

MACHINERY
FOR WOOD
WORKING.

Our Machines
represent the latest
and
best results of
American
Ingenuity.

Send for new
Catalogue
of
Specialties.

ALFRED BOX CO.,
Front, Poplar and Canal Sts
Philadelphia, Pa.

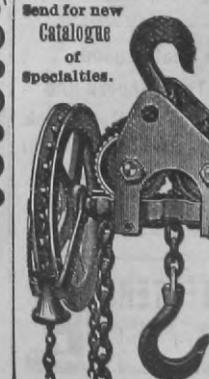
Manufacturers of
Box's Pat. Double

Screw Hoist
13,000 in use.

Many have done hard
continuous duty 5 years
without a single part
being renewed. This is the
key of our success. They
have built up a reputation
themselves that cannot be
approached. Our improved

Radial Drills

are also assuming the same
standard.



MONEY SAVING SPECIAL TOOLS.

—We have enlarged our facilities for producing small tools for special purposes and this department of our business is in charge of an experienced and skillful designer. Manufacturers of Hardware, Metal Goods and Novelties may greatly reduce costs by adding small tools, special dies, &c., to the machinery already in use. Write us, stating your needs.

THE E. J. MANVILLE MACHINE CO., - WATERBURY, CONN.

FINE . . . DESIGNS FOR
MACHINE ⚡ AUTOMATIC . . .

WORK . . . MACHINERY .

The L. E. RHODES CO., . . .
HARTFORD, CONN.

SPECIAL

And Automatic Machinery and Tools for reducing cost of manufacturing machines, parts of machines, articles of hardware, &c., designed and built. Tools, models and experimental work. Estimates given. Correspondence solicited.

IDEAL MACHINE WORKS,
P. O. Box 655 Hartford, Conn



J. Popping's
Patent Machine
and Tool Wks.

MANUFACTURERS OF
Solid Iron Shoulder Rabbet Planes, etc., etc., and
Hofstatter's Patent Hair Picking Machine.
N. E. Cor. 58th St. and 11th Ave., N. Y.

Saves
Rewriting
Names

The Scattergood
Time Record and
Pay Roll Book.
(Pat. Oct. 13, 1891.)
Address for Circular to
THE SCATTERGOOD CO.,
Laurel St., Philadelphia

PATTERN LETTERS
For Iron and Brass Castings.
Various Sizes and Styles.
Heber Wells, 157 William St., N.Y.

A Boring and Turning Mill

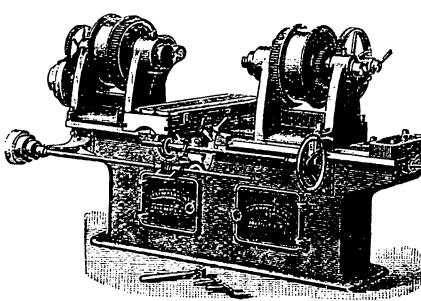
Did you ever notice that a Mill can do more work than a Lathe?

We have a variety of sizes, with regular and special heads.

BULLARD MACHINE TOOL CO.

E. P. BULLARD, Pres., Bridgeport, Conn.

NEW YORK OFFICE, 145 BROADWAY AND 86 LIBERTY ST.



Duplex Milling Machine.

BEAMAN & SMITH,

FOR NUMBERING AND LABELING
Boxes, Drawers and Shelves
In Hardware Stores and Factories.

Send for sample and description of our Handy
box of small gummed Letters and Figures, intended
for labeling shelf boxes. Put up especially for the
hardware trade.

THE TABLET AND TICKET CO., Mfrs.
37-59 Franklin St.,
Chicago.

HAVE YOU HEARD that machine tool builders keep up with the times? **MODERN** tools turn out work at **LOW COST** compared with our **GRANDFATHERS'** days. There are **IDEAS** in our catalogue C.

SEND FOR IT.

PROVIDENCE, R. I.

**WILLSON'S
PAPER
LETTERS**

NEW AND SECOND-HAND MACHINERY

IN STOCK.

ENGINE LATHEs.

	PLANERS.
10 in. x 5 ft. Improved.	19 in. x 3 ft. Wheeler.
13 in. x 6 ft. Blaisdell.	20 in. x 6 ft. Pratt & W.
14 in. x 6 ft. Pittsburgh.	22 in. x 6 ft. Pease.
14 in. x 6 ft. Flather Taper.	24 in. x 4 ft. Wood Light.
15 in. x 8 ft. Improved.	24 in. x 5 ft. New Haven.
15 in. x 6 ft. Prentice.	24 in. x 6 ft. Wood Light.
16 in. x 6 ft. Pond.	24 in. x 6 ft. Powell.
16 in. x 6 ft. Ames.	26 in. x 6 ft. N.Y.S. Eng. Co.
16 in. x 6 ft. Pittsburgh.	27 in. x 6 ft. Pond.
17 in. x 6 ft. Prentice.	30 in. x 10 ft. Bancroft.
18 in. x 8 ft. Flather.	30 in. x 8 ft. Powell.
20 in. x 10 ft. Putnam.	38 in. x 12 ft. Powell.
20 in. x 10 ft. Prentice Taper.	60 in. x 20 ft. Steam Eng. Co.
20 in. x 12 ft. Putnam.	
22 in. x 14 ft. Putnam.	
24 in. x 15 ft. Pittsburgh.	
28 in. x 16 ft. Fay & Scott.	
30 in. x 16 ft. Perkins.	
34 in. x 8 ft. Putnam.	
35 in. x 15 ft. Heves & Phil.	
36 in. x 18 ft. Improved.	
48 in. x 20 ft. Pittsburgh.	

BRASS LATHEs.

15 in. x 5 ft. Turret Fox.	
18 in. x 6 ft. Cabinet Fox.	

SCREW MACHINES.

Nos. 1, 2 and 3 Improved

Wire Feeds.

MILLING MACH.

"Universal," Improved.

"Tool Room Size."

"Universal," Improved.

"Largestize," Improved.

Standard Sizes, Plain, with

Auto. Feeds and Arms.

Brown & Sharpe No. 6

Plain.

Lincoln Pattern, Plain.

UPRIGHT and HOR-

IZONTAL MILLS.

No. 2 Hor. Boring and Drill-

ing Machine. "Bements."

Cylinder Borer. Bements

B. & S. Turret Borer, 36 in.

Boring and Turning Mill.

88 in. Two Heads.

	SHAPEs.
8 in. Stroke, Gould.	8 in. Stroke, Heavy.
16 in. Stroke, Hendey.	16 in. Stroke, Gould & Eber.
18 in. Triple Geared.	22 in. Triple Geared.
22 in. Triple Geared.	26 in. Triple Geared.
14 in. Traveling Head,	
Pittsburgh.	

DRILLS.

Hand Rolls. 56 in.

Power Rolls. 6, 7, 8, 10 ft.

Bement Boiler Planer.

BRIDGE AND BOIL-

ER PORTABLE

RIVETErs.

"Allen's" latest patterns.

60 in. for Boiler work.

26 in. for Bridge work.

34 in. for Bridge work.

MISCELLANEOUS.

Acme 1 in. Bolt Cutter

with Dies and Taps.

Slotters 10 and 18 in.

Stiles 100 lb. Fric. Drop.

Ferris & Miles 800 lb.

Steam Hammer.

J. J. McCabe,

14 Dey Street, - New York,
Successor to E. P. BULLARD'S N. Y. Machinery
Warerooms.

New and Second-Hand Machinery.

1 32 in. x 16 ft. Fay & Scott Lathe. New.
 1 28 in. x 12 ft. Fay & Scott Lathe. New.
 1 28 in. x 12 ft. Wood & Light Power Feed
Lathe. Second-hand.
 1 24 in. x 12 ft. Screw Cutting Lathe. Second-
hand.
 1 18 in. x 6 ft. Star Tool Lathe. Second-hand.
 1 16 in. x 6 ft. Dexter Lathe, P. F. New.
 1 16 in. x 8 ft. Blaisdell Lathe, Rame and Fall
Rat. New.
 2 16 in. x 6 ft. Porter Lathes. New.
 1 16 in. x 6 ft. Dustin & Hubbard Lathe. New.
 1 14 in. x 6 ft. Hendey Lathe, Taper Attach-
ment. Second-hand.
 1 48 in. Chucking Lathe. Second-hand.
 10 No. 1 Davis Improved Keyseaters. New.
 5 No. 2 Davis Improved Keyseaters. New.
 1 Wells Bros. Cutter Grinder. New.
 1 No. 6 Diamond Grinder.
 1 18 H.-P. Engine. Second-hand.
 1 10 H.-P. Engine. Second-hand.
 1 8 H.-P. Engine. Second-hand.
 1 50 H.-P. Woodbury & Booth Engine. Second-
hand.
 1 10 H.-P. Woodbury & Booth Engine. Second-
hand.
 1 6 H.-P. Vertical Engine. Second-hand.
 1 25 H.-P. Otto Gas Engine.
 1 2 H.-P. Baxter Engine and Boiler. Second-
hand.
 1 8 H.-P. Baxter Engine and Boiler. Second-
hand.
 1 35 H.-P. Payne Engine. Second-hand.
 This list will be changed each week.

W. P. DAVIS,

Rochester, N. Y.

50 H.P. Vertical Boiler.

Second-hand, in use three
weeks.Will name price complete.
We had two of them, but
one remains.

THE SCRANTON SUPPLY & MACHINERY CO.,

SCRANTON, PA.

Second-Hand Iron Planers and Engines for Sale.
 One David Pond Iron Planer, 32 in. x 32 in. x 10 ft.
 Double Head.
 One Lucius Pond Iron Planer, 33 in. x 33 in. x 10 ft.
 Single Head.
 One Wm. Light & Co. Iron Planer 27 in. x 27 in. x 6 ft.
 Single Head.
 One Wm. Davis Iron Planer, 24 in. x 24 in. x 6 ft.
 Single Head.
 One Wm. Davis Iron Planer, 24 in. x 24 in. x 6 ft.
 Single Head.
 One Wm. Davis Iron Planer, 24 in. x 24 in. x 6 ft.
 Single Head.
 Two Element, Miles & Co. Iron Planers, 20 in. x 20 in.
 x 4 ft. Single Head.
 One R. A. Belden & Co. Iron Planer, 16 in. x 16 in.
 x 24 in. in Crank.
 One Pratt & Whitney Iron Planer, 16 in. x 16 in. x 3 ft.
 One Hand Planer, 8 in. x 8 in. x 18 in.

ENGINES.

One 84 in. x 10 in. Armington & Sims Automatic Horizontal Engine.
 One 144 in. x 16 in. Armington & Sims Automatic Horizontal Engine.

L. F. Seyfert's Sons 437-441 N. 3d St., Phila., Pa.

FOR SALE.

3 Steam Shovels.

7 Locomotives, Standard and Narrow.

27 Cars, 2 and 3 feet gauge.

11 Hoisting Engines.

27 Steam and Centrifugal Pumps.

5 Iron Planers.

Engines and Boilers.

THOMAS CARLIN'S SONS,
Allegheny, Pa.

SECOND HAND MACHINERY.

ENGINE LATHEs.

MILLING MACHINES.

Rise and Fall.

15 in. x 6 ft. Prentice Bros.

Rise and Fall and Taper.

14 in. x 8 ft. Fitchburg. Rise and Fall.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

14 in. x 6 ft. Putnam Compound Rest.

Second-hand Tools.

LATHES.

1 13 x 6 Pratt & Whitney Lathe.
1 14 x 5 Wheeler Lathe.
1 15 x 6 Porter Lathe.
1 16 x 6 Bogart Lathe.
1 17 x 12 Engine Lathe.
1 18 x 6 Putnam Lathe.
1 18 x 8 New Haven Lathe.
1 20 x 8 Porter Lathe.
1 20 x 10 Porter Lathe.
1 20 x 12 Blaisdell Lathe.
1 21 x 8 Lodge & Davis Lathe.
1 24 x 12 Lodge & Davis Lathe.
1 30 x 23 Sellers Lathe.

PLANERS.

1 22 x 23 x 4 Whitcomb Planer.
1 24 x 24 x 7 New Haven Planer.
1 24 x 24 x 8 Lodge & Davis Planer.
1 36 x 30 x 8 Hollingshead Planer.
1 36 x 36 x 8 Cove Planer.
1 40 x 36 x 10 Steptoe Planer.

DRILLS.

1 3 ft. Batman Radial Drill.
1 20 in. Lodge & Davis Sliding Head Drill.

SHAPERS.

1 15 in. Juengst Shaper.
1 18 in. Shaper.
1 20 in. Lodge & Davis Crank Shaper.

MISCELLANEOUS.

1 18 x 8 Automatic Turret Lathe.
1 15 x 6 Fox Monitor Lathe.
1 80 lb. Long & Alstatter Herve Hammer.
1 1/2 in. Long & Alstatter Punch and Shear.
1 Buffalo Forge.
1 B. G. Plain Milling Machine.
1 No. 3 Garvin Miller.

The Lodge & Davis

MACHINE TOOL CO.,

CINCINNATI, O., U. S. A.

SECOND-HAND MACHINERY.

1 Iron Planer 60 in. x 60 in. x 20 ft., 2 heads on Cross Rail.
1 Iron Planer 40 in. x 36 in. x 12 ft., 130 in. x 30 in. x 8 ft.
1 Iron Planer, D. W. Pond, 26 in. x 28 in. x 8 ft.
1 Engine Lathe 60 in. x 18 1/2 ft., New, Bargain.
1 Engine Lathe 24 ft. bed, 54 in. swing, D. W. Pond make, A1.
1 Engine Lathe 48 in. x 16 ft., raised to 60 in., Putnam make.
1 Engine Lathe 34 in. x 8 ft. 1 30 in. x 1 ft., Putnam.
1 Engine Lathe 28 in. x 10 ft., D. W. Pond make.
1 Engine Lathe 20 in. x 12 ft., New Haven, 1 18 in. x 8 ft., New Haven.
1 Drilling Machine 40 in., B. G. S. F. 1 36 in., B. G. S. F., both New Haven.
1 6 ton Foundry Crane, A1.
1 10 ton Foundry Crane, A1.
1 8 in. x 12 in. Hoisting Engine.
1 14 in. x 32 in. Watts & Campbell Engine.
1 14 in. x 36 in. Watts & Campbell Engine.
All kinds of Iron and Wood Working Machinery.
Lists sent. NEW YORK MACHINERY DEPOT,
Office 178 Broadway, N. Y.

FOR SALE.

SECOND-HAND.

ENGINES, Horizontal and Vertical. All types and sizes up to 2000 H.P.
BOILERS, Vertical and Horizontal, and 3 Batteries of "Heme" water tube.
MILLS, 3 high, 12 in., 20 in., 22 in., 30 in. and 36 in.
1 Reversing 32 in. Blooming Mill complete.
STEAM HAMMERS. Various sizes up to 10 ton.
SHEARS for Bars, Rails, Blooms and Plates.
SQUEEZERS, ROLL LATHES, CRANES, GRINDING PANS, MACHINE SHOP TOOLS, &c.
LOCOMOTIVES. Fine condition, various sizes and gauges.
"If you don't see what you want, ask for it" of

B. M. EVERSON,
301 Smithfield St., Pittsburgh, Pa.

SECOND-HAND MACHINERY FOR SALE.

Planers, Drills and Lathes, good as new, for cash.

DIETZ, SCHUMACHER & CO.,
Cincinnati, O.

WANTED.

To furnish reasonable estimates on specialties in light metal work.
CLARK & COWLES, Plainville, Conn.
Manufacturers of Clock Trimmings, Rivets, Springs &c.

Locomotives.

1 36 tons Stan. Gauge Pass. Loco.
5 37 tons " " " "
1 20 tons " " Shifting Loco.
2 10 tons " " Saddle Tank Loco.
1 7 1/2 tons " " " "
1 30 tons 36 in. gauge 8 driver Freight Loco.
1 21 tons " " 6 " "
1 16 tons " " 6 " Saddle Tank.
1 18 tons " " 4 " With Tender.
1 15 tons " " 4 " Saddle Tank.
1 11 tons " " 4 " Back Truck.
1 7 1/2 tons " " 4 " Saddle Tank.
And many others.

THOS. P. CONARD,
206 Walnut Place, Philadelphia.

FOR SALE.

SECOND-HAND.

CORLISS ENGINES, 36 in. dia. and under.
PUMPS of all kinds and sizes.
DYNAMOS, 50 to 500 light capacity.
B. I. LERS, (Stationary), 4-150 H. P.
LOCOMOTIVE BOILERS, 20-250 H. P.
AIR COMPRESSORS, (6 Sizes).
ROCK DRILLS, 1 1/2 in., 5 in. dia.
ICE MACHINES, 2 of 15 tons each.
HOISTING and DREDGING ENGINES,
10-500 H. P.
TANKS, Round, Square, Closed and Open.

Write for what you need to

MARVIN BRIGGS, 12 Broadway, N. Y.

DOUBBLE CORLISS CONDENSING ENGINE, 600 H. P., One 15 in. by 42 inch Corliss Engine, 125 H. P. Double Automatic Engine, 350 H. P., two 100 H. P. Phoenix Automatic Compound Engines 45 and 5 H. P. Westinghouse Engine, one 125 H. P. Rock Engine, one 7 x 7 Southwick Automatic Engine, one 4 H. P. Otto Gas Engine, 100, 200, 300 and 500 H. P. Feed Water Heaters, 30 to 100 H. P. Return Tubulars, 70 H. P. Locomotives, 60 H. P. Vertical Boilers, good for 100 pounds.

FRANK TOOMEY, Office 131 N. 3d St. Ware houses—9 1/2 to 980 Broad Street, 159 to 161 Canal Street, Philadelphia.

SOME BARGAINS HERE.

1 Hendey Shaper, 15 in. stroke, imp. vise.
1 14 x 6 Screw Cutting Engine Lathe, New.
Pattern Makers' Speed Lathe, 7 ft. bed, \$40. New.
2 1/2 Hendey Cutting-off Machine, New.
44 in. C. & D. Resaw. Fine condition.
Radial Drill, 5 1/2 ft. arm.
Axle Cutting-off Machine, Double Head, cut 9 1/2 dia.
Quantity 2 hand Dodge Pulleys. Cheap.
Safety Construction Company's combined Trap and Pump.

And other machinery, new and second hand. Write for prices. **MACHINISTS' SUPPLY COMPANY**, 89, 41 and 43 Central Ave., Rochester, N. Y.

A LARGE ADDITION TO OUR STOCK OF CORLISS ENGINES.

Also HIGH SPEED, ETC.

SEND FOR CATALOGUE.

Corliss—26 x 48, 28 x 36, 30 x 72, 10 x 20. Several large sizes guaranteed, viz.: 18 x 48, 23 x 48, 28 x 48, 30 x 48, 26 x 60. Many other sizes on hand. Porter-Allen 11 x 16 and other High Speeds. An assortment of Horizontal Tubular Boilers, Large Duplex Fire Pump, Brennan Crusher, Platform Scales, Burr Mill, Bogardus Mill, etc., etc.

G. M. CLAPP, 74 Cortland St., N. Y.

FOR SALE.

20 Arc Light U. S. Electric Lighting Co. Dynamos.
5 Hockhausen Dynamos.
100 Arc Lamps
2 Double Hoisting Engines.
2 large Ferracut Circular Shears.
1 Bonnett Air Compressor, 12-20 x 30.
3 Steam Fire Engines.
1 50-ton Track Scale.
230 New Steel Electric Car Wheels.

WALSH'S SONS & CO.,
260-264 Washington St., Newark, N. J.
Dealers in Scrap Iron, Metals, Machinery, etc.

WE WANT TO BUY SCRAP,

Iron or Steel Rails,

Busheling Scrap,

Bridge Material, &c.

Will pay spot cash for the above in carload lots.

C. H. SIBELL & CO.,

Manhattan Building, Chicago.

SECOND-HAND MACHINE TOOLS.

ENGINE LATHES.

9 in. Pratt & W. Bench.
No. 1 2-Spindle Garvin.
No. 2 3-Spindle Garvin.
No. 3 4-Spindle Garvin.
No. 3 6-Spindle Garvin.
20 in. Bickford, Lever & W.
4 in. Aurora, Back Geared.
30 in. Pond, Back Geared,
P. F.
7 ft. Alfred Box Universal
Radial.

PLANERS.

16 in. x 6 ft. Blaisdell.
16 in. x 8 ft. Perkins, taper.
16 in. x 8 ft. Blaisdell.
18 in. x 6 ft. New Haven.
18 in. x 6 ft. Bradford.
18 in. x 8 ft. Blaisdell.
18 in. x 8 ft. Wamesit.
18 in. x 10 ft. Blaisdell.
18 in. x 9 ft. D. W. Pond.
20 in. x 6 ft. Bullard.
24 in. x 12 ft. Geo. Gage.
29 in. x 12 ft. Fifield.

SCREW MACHINES.

No. 5 Brown & Sharpe.
No. 2 Warner & Swasey.
No. 3 Windsor Machine Co.
No. 24 Pratt & Whitney.

DRILL PRESSES.

No. 3 G. irvin.

FLATHER & CO.

18 in. x 5 ft. Flather & Co.
36 in. x 7 ft. Lodge & LaThe.

MILLING MACHINES.

No. 1 Pratt & W. Lincoln.
No. 2 Pratt & W. Lincoln.
No. 0 Garvin. Universal.

SHAPERS.

No. 5 Bradner. Standard
Universal.

UNIVERSAL.

No. 3 Garvin Lincoln.

DUPLEX.

No. 2 Garvin Duplex.

DUPLEX.

No. 3 Garvin Duplex.

Garvin Heavy Slab Miller.

Also a large number of other machines. Write for complete list and detailed description.

THE GARVIN MACHINE CO.

Laight & Canal Sts., New York.

Also 51 North 7th St., Philadelphia, Pa.

FOR SALE.

Baker Blowers, Nos. 3, 4, 5, 5 1/2, and 7 1/2.

Root Blowers, Nos. 1, 2, 3, 5, 6 and 7.

Worthington Duplex Pump, Compound, 25 in. x 43 3/4 in. x 9 1/4 in. x 36 in., equal new.

D. W. Pond Planer, 26 in. x 26 in. x 8 ft., equal new.

Niles Boring and Turning Mill, 37 in., equal new.

9. Hewes & Phillips Lathes, 12 in. to 21 in.

Numerous Engines, Boilers, Pumps, Tanks, Crushers, Compressors, Rock Drills, Hoisting Engines, &c., cheap.

C. R. BIGELOW, 45 Dey St., New York City

MACHINERY FOR SALE.

Planer 28 in. x 24 in. x 7 ft. New.

Drill Press, 40 in. swing. New.

Engine Lathe, 24 in. x 25 ft. bed. 2d hand.

Root Blowers, Nos. 1, 2, 5 and 6. 2d hand.

Haskin Vertical Engine, 9 x 9. 2d hand.

Improved 3 in. Band Saw. New.

Vertical Boiler, 40 H. P. 2d hand.

Open die Bolt Cutter 1/4 to 1 1/4 in. 2d hand.

Write us before buying. COOKE & CO., Machinery and Supplies, 163 and 165 Washington St., New York.

FOR SALE.

Lathe, 52 in. swing, 40 ft. long, triple geared.

New Steam Engines, 16 x 24, 14 x 24, 12 x 24, 6 x 12.

Rebuilt Engines, 14 x 24, one pair 4 x 8.

Five hundred iron pulleys 10 ft. dia. and less.

W. M. A. BOLE, Trustee,

25th St. Cor. Liberty Ave., Pittsburgh, Pa.

FOR SALE.

Double Deck Boilers about 40 H. P. each, Hoisting Engine. Cylinder Boilers for Stacks, 30, 36 and 42 in. diameter. Round and Square Iron Tanks. Blow Offs. 5 Brass Cannons about 1400 or 1500 pounds each. Geod on hand. All kinds of Scrap Iron and Metals on hand.

BUSSENUS & CUNLiffe,

12th and Washington Ave. Philadelphia.

FOR SALE.

Rolling Mill Engines.

28 x 60 Horizontal, heavy wheel.

Slide Valve.

14 x 30 " " " "

13 x 24 " " " "

32 x 48 Vertical, 25 ton wheel.

38 x 30 " 20 " " "

30 x 30 " 20 " " "

Also Rotary Squeezer, Rail Shear, Scrap and Bar Shears, 12 in. Bar Mill, 20 in. Muck Mill, 20 in. Plate Train. One Structural Jib Crane, 20 tons cap. Address

C. W. SCHULTZ & CO.,

308 Walnut St., PHILADELPHIA.

SECOND-HAND.

*Wanted to buy. Geared Shaper, 18 in. or 24 in. Upright Hammer, 34 or 40 lbs.

I. I. FARRAR, Toolmaker,

Sheridan Ave., Paterson, N. J.

SECOND-HAND MACHINERY.

ENGINE LATHES.

10 in., 11 in. and 13 in. Swing, 4 and 5 ft. Bed Lathes, Reed, French and L. & N. 15 in., 16 in., 18 in., 19 in. and 20 in. Swing, 6 and 8 ft. Bed Lathes, Dustin, Pond, Young, Fifield and Bullard. 24 in., 26 in., 28 in., 32 in. and 36 in. Swing, 10 ft., 16 ft. and 18 ft. Bed Lathes. Fifield, Dustin, Blaisdell and Perkins.

PLANERS.

1 17 in. x 17 in. x 30 in. Hand Planer. 1 16 in. x 16 in. x 3 ft. Crank Planer. 1 17 in. x 17 in. x 3 ft. L. & M. Planer. 1 20 in. x 20 in. x 4 ft. L. & M. Planer. 1 24 in. x 24 in. x 6 ft. Pease Planer. 1 24 in. x 27 in. x 5 ft. White Planer. 1 60 in. x 60 in. x 22 ft. Heavy Planer with 4 heads. 1 60 in. x 60 in. x 22 ft. Heworth, 1 head. 1 8 ft. Boring and Turning Mill with pulley attachment.

DRILL PRESSES.

2 20 in. Drill Presses, Prentiss & Davis. 1 20 in. x 36 in. Gap Lathe. 3 Slant Drills, 1 one-spindle, 2 two-spindles. 2 Pratt & Whitney 1 and 2 spindles. 6 bench Drills. 1 50 in. Heavy Geared Post Drill. 1 each No. 2, 3 and 4 Garvin Gang Drills.

SHAPERS.

15 in. Stroke, Smith. 15 in. G. & E. Make. 17 in. and 24 in. Chase & Hendy.

SPEED LATHES.

10 in., 12 in. and 14 in. Swing, 3 and 5 ft. Beds, Garvin and Spencer.

ALSO LARGE STOCK NEW TOOLS.

THE NILES TOOL WORKS CO. Eastern Branch, 136, 138 Liberty St., N. Y. City.

RAILS FOR SALE. Second-hand Relaying.

1000 tons 60 lb. Steel.	50 tons 35 lb. Iron.
150 " 60 lb. "	150 " 30 lb. "
100 " 56 lb. "	360 " 25 lb. Steel.
150 " 52 lb. Iron and Steel.	60 " 20 lb. "
40 tons 40 lb. Iron.	20 " 36 lb. 4 in. Johnson Girder
250 " 40 lb. Steel.	Rails.

27 different gauge second-hand locomotives. J. H. RICHARDSON & CO., Pittsburgh, Pa.

OLD RAILS AND SCRAP IRON

bought and sold by WM. H. PERRY & CO., Providence, R. I.

A BARGAIN.

A fine business opportunity for a live business man or two partners who have \$25,000 to invest in a first-class, old, well established and well located jobbing and retail Hardware business, which did not lose money last year. Stock is well assort. Good location in large Eastern City. Reasonable lease of premises can be continued. This will bear full investigation. Parties who can command above amount of capital address

"BARGAIN," Box 315, office of *The Iron Age*, 96-102 Reade St., N. Y.

FOR SALE.—To close an estate, on account of death of principal. An old and well established jobbing and retail Hardware business, located in one of the largest manufacturing cities in the State of California. The best location in the State, outside of San Francisco for a jobbing business. Stock is well assort. and consists of shelf and builders' hardware, mechanics' tools, bar and sheet iron, etc. Will inventory about \$40,000. Terms and statements to principals only. Address "A. B. C." Box 104, office of *The Iron Age*, 96-102 Reade St., N. Y.

WANTED.

By a thoroughly equipped general foundry and machine works, some specialty to manufacture in the machinery line. Heavy machinery preferred. Address

"INTERNATIONAL,"

office of *The Iron Age*, 96-102 Reade St., N. Y.

To File Manufacturers.

We have just taken for sale a complete plant of a File manufacturing concern situated within an hour's ride from Boston.

It consists of a number of the Hess cutting machines, helve and upright Bradley hammers, shears, a complete outfit for heating by oil, with necessary tanks, pump, pipes, gauges, etc., about a carload of grindstones (face 18 in., diameter 30 in.), a number of tons of file steel of different shapes, which have never been cut or worked, also a lot of forged blanks. In fact, the plant is complete in every way and has been run but a very short time and everything is in fine order. This outfit must be disposed of at once and we propose to sell it in a lump or by pieces, as may seem most advantageous.

If you are interested, kindly let us hear from you, and promptly.

HILL, CLARKE & CO.,

156 Oliver St., Boston, Mass.

BUILDINGS AND POWER FOR SALE and To Let.

Good buildings for various manufacturing purposes. Excellent and never failing water power, also steam power, steam heat and electric lights. Land for the erection of other buildings if required. Shipping facilities are the best. The whole or a part of this plant can be had on very reasonable terms. For any particulars address

"X 100," office of *The Iron Age*, 96-102 Reade St., New York.

TO RENT.

A comfortable and convenient office, nicely carpeted, steam heat and gas, including desk and office furniture, on second floor, No. 2½ Murray St. Also floor space if desired. Cheap to the right party.

D. A. GOODRICH.

FOR SALE.

The old established Iron, Steel and Storage business conducted for thirty years or more by the late Albert T. Converse, in Norwich, Conn.

Since Mr. Converse's decease the business has been conducted by the Administrator at the old location, No. 23 Commerce St.

The property for sale consists of Warehouse containing store and three lofts, with wharf property, office and wareroom furniture and fixtures and stock of Iron and Steel.

The Real Estate, Fixtures and Furniture and stock of Iron and Steel will be sold all together at a low cash price, or, if not possible to do this, they may be sold separately.

Any one interested may obtain particulars by addressing S. T. HOLBROOK, Administrator, River Ave., or WILLIAM F. CONVERSE, 23 Commerce Street, Norwich, Conn.

Who is in the market for a lot of 2-inch Four Ply Water Hose?

We have in stock about 1000 feet of best quality 2½ in. four ply water hose, which we will sell at 35¢ per foot (price of 2 in.), with couplings, thread to suit regular 2 in. hose coupling, or to fit 2 in. wrought iron pipe. Address

REUTER & MALLORY,
22 Light St., Baltimore, Md.

Chicago Storage Warehouse.

General merchandise storage, with desk room if wanted, situate in wholesale district.

Apply to C. P. SHERWOOD,
294-300 Franklin Street,
Chicago, Ill.

WANTED.

Second-hand, No. 4 or 5 Stiles Press. Address "E. A.," No. 1027, office of *The Iron Age*, 96-102 Reade St., New York.

BRASS MOLDER.

with first-class reference, capable of taking charge of foundry, wants a position, or would like to buy established foundry with trade for reasonable price Address "C. E." 18 Mechanic St., New Haven, Conn.

WANTED.

A manufacturer wants to add to his line some new specialties that will sell to the Jobbing Hardware, Saddlery or Woodenware Trade. Address "JOB-BING TRADE," office of *The Iron Age*, 96-102 Reade St., New York.

WANTED.

To buy for cash, first-class second-hand Engine Lathes, Planers, Drill Presses, Shapers, Milling Machines, Etc., Etc. Address

THE
FOSDICK & PLUCKER
MACHINE TOOL
CO.,
Cincinnati, Ohio.

PITTSBURGH SALES AGENCY,

J. H. HILLMAN, Manager,

No. 8 Wood St., Pittsburgh, Pa.,

Offers for sale at very low prices BESSEMER STEEL WORKS; STRUCTURAL STEEL MILLS, also STEEL MILL FOR ROLLING BARS AND COLD ROLLING, 2 BLAST FURNACES, RUSTLESS IRON WORKS, GLASS WORKS, FOUNDRY, PLANNING MILL, BRICK WORKS, and numerous other manufacturing interests and large quantity of very desirable Coal Properties improved and unimproved.

Dealers in Coal and Iron Lands.

Examination and Reports
on Properties.
References on Application.

WANTED.

By a large manufacturing establishment some new specialty to make and sell to the Jobbing Hardware, Crockery or Grocery trade. Address

"NEW SPECIALTIES," office of *The Iron Age*, 96-102 Reade Street, New York.

A Rare Business Chance.

For sale, in a live, wide awake Western city, a Hardware, Agricultural Implement, Stove, Tinware and Plumbing business having a good retail and jobbing trade, that extends over a very large territory. Stock will now invoice about \$30,000 but can be reduced. Best of reasons for selling. Full information and references furnished to those meaning business. Location the best in the United States for any one suffering from pulmonary troubles. Address

FRANK MARION, care Maxwell House,
Nashville, Tenn.

FOR SALE.

A new iron building for immediate shipment, 81 ft. wide, 200 ft. long, consisting of a main span 61 ft. wide, with lean-to on one side 20 ft. wide. The trusses are sufficiently strong to carry a line of shafting and light jib crane. This building is suitable for a Machine Shop, Tin Plate Mill, Rolling Mill, etc. For further information address

SHIFFLER BRIDGE CO.,
Pittsburg, Pa.

FOR SALE CHEAP.

About five tons Sheet Steel, Gauge 20, in pieces 10 inches long and 2½ inches wide. Address D. J. C. ARNOLD,
New London, Ohio.

WANTED.

Price and description of 30-inch gauge Mine Locomotive. Must be in good condition.

WOODWARD IRON CO.,
Woodward, Alabama.

Hosted by Google

Receiver's Public Sale

OF A

VALUABLE STEEL MILL,
PLANT AND SITE,

KNOWN AS THE

WINDSOR LOCKS STEEL CO.,

Located at Windsor Locks, Ct.

Will be sold at Public Sale, on the premises, on Saturday, November 10th, 1894, at 1 o'clock P.M. This mill is equipped with a 12 in. and 18 in. mill for rolling Merchant Steel, also with a 10 in. mill (not set up). It has full set of Rolls, Shears, Saws and Machine Tools. A new Steam Plant, consisting of new Water Tube Boilers, Feed Water Heater, Engines, etc., complete; also with new Heating Furnaces and Electric Light Plant and with a Water Power derived from The Connecticut River Water Co., under a lease extending over a period of 999 years, at extremely moderate rates. This is one of the most valuable water privileges in New England. The site consists of 600 ft. of land fronting on the Canal of The Connecticut River Water Co. and with a width of from 150 to 200 feet. It is situated on the line of the N. Y. N. & H. R. R. at a point midway between Springfield, Mass., and Hartford, Ct., affording ample freight facilities.

By order of the United States Circuit Court, District of Connecticut.

E. N. SPERRY, Receiver,
United Bank Building, Bridgeport, Conn.

Letters Patent No. 527,668,
Oct. 16th, 1894.

Metallic Tie,—Railroad.

The Patentee, unable to handle, desires to sell at once. Reasonable price. Address

J. C. COWDRICK,
Ogdensburg, New Jersey.

FOR SALE.

About 4000 tons second-hand 58 lb. Steel T Rails, fit to relay, with fastenings to match. Will divide the lot if necessary. Address

JUSTICE COX, Jr., Iron and Steel,
218 So. 4th St., Philadelphia.

Special Notice

to Hardware buyers. You can buy Trowels and other tools too numerous to mention, of superior quality, at prices to suit the times. Address all communications to

CHAS. A. VAUGHN, Manufacturer,
Vineland, N. J.

HARDWARE STORE FOR SALE.

One of the oldest established retail Hardware stores in Eastern Indiana, located in county seat of 2500 population, in the center of rich agricultural and manufacturing district. Stock in good condition. Only one other hardware store in town. Will sell reasonably. Address "L.", office of *The Iron Age*, 22 & 24 Pickering Building, Cincinnati, O.

OPPORTUNITY TO SECURE MEXICAN TRADE.

A gentleman of large experience in Mexican trade, thoroughly conversant in the language, familiar with the wants of and of extensive personal acquaintance in that country, will return shortly to establish himself permanently in the city of Mexico as the representative of several leading manufacturers of the United States. His syndicate not being quite completed he solicits correspondence from parties desirous of extending their trade to that market. Address "MEXICANO," office of *The Iron Age*, 98-102 Reade St., N. Y.

FOR SALE.

A second-hand Heating Fan, 6 x 6 Engine, with one 2500-foot Heater complete. Also about 200 feet Galvanized Iron Flue ready for use.

BINDLEY HARDWARE COMPANY,
Pittsburgh, Pa.

Locations for
Factories.

The name of the Chicago, Milwaukee & St. Paul Railway has long been identified with practical measures for the general upbuilding of its territory and the promotion of its commerce, hence manufacturers have an assurance that they will find themselves at home on the company's lines.

The Chicago, Milwaukee & St. Paul Railway Company owns and operates 6,150 miles (9,800 kilometers) of railway, exclusive of second track, connecting track or sidings. The eight States traversed by the company, Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota and North Dakota, possess, in addition to the advantages of raw material and proximity to markets, that which is the prime factor in the industrial success of a territory—a people who form one live and thriving community of business men, in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tan-bark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable. Address

LUIS JACKSON,

Industrial Commissioner, C. M. & St. P. R.Y.,
425 Old Colony Building, Chicago, Ill.

FOR SALE.

A valuable United States patent. Can be manufactured at a small cost and sold for a good price to dealers in machinists' tools, hardware manufacturers, clock manufacturers, &c. Nothing of the kind on the market. Will be sold cheap and full particulars given.

P. J. CONROY,
Paschall, Phila.

Valuable to Manufacturers of Wrought Steel Products.

Patents for sale or lease on royalty covering the manufacture in wrought steel of a line in most extensive use, now made in cast iron and also wood. The patents covering the article and its manufacture enable a production in wrought steel at less than one-half the cost of the cast iron or wood products and exceedingly superior to either. The inventor has by actual manufacture demonstrated the feasibility and economy of his methods and the value of the article, samples of which or photographs and description thereof will be sent interested parties. Address

"PATENTS,"
office of *The Iron Age*, 98-102 Reade St., N. Y.

FOR SALE.

One of the oldest established retail and wholesale Hardware, Stove and Plumbing businesses in Luzerne County. Situated at Wilkes-Barre in the heart of the richest coal field in America. Will sell stock reasonable and charge nothing for good will. Will either sell or give literal lease on building, which is 25 by 104 ft., six stories high, on one of the most prominent business corners in the city. Our reason for selling is, our manufacturing business in another part of the city has grown to such proportions that we desire to devote our entire attention to same

W. B. BERTELS, SON & CO.,
180 East Market St.,
Factory, Cor. Canal & Butler Sts.,
Wilkes-Barre, Pa.

TO LET
FOR
MANUFACTURING USES.

At South Easton, Pa., on line of Lehigh Valley Railroad and on Lehigh Canal. Sidings in buildings. Electric light. Electric street railway. One main 2-story building, 275 ft. x 45 ft. Steam Engine, Shafting and complete appurtenances for first-class factory or machine shop. One high 1-story building, 80 ft. x 45 ft., Cement floor. One 2-story building, 35 ft. x 45 ft., ground floor suitable for smith shop, etc.

These buildings were erected for galvanizing and barb wire plant, and more recently, for several years, have been in the occupancy of The National Switch & Signal Co. They form part of the plant of The Stewart Wire Co., being separated from its main plant by the Lehigh Canal. Affords a most desirable opportunity for industry using wire in any of its forms and is an exceptionally fine location for manufacture of any character.

Will be let in whole or in part, with or without the adjacent thoroughly equipped and complete Wire Drawing Mill, steam and water power, situated on same side of Canal. For further particulars address

THE STEWART WIRE CO.,
Easton, Pa.

LAKEVIEW, WASHINGTON.

A model manufacturing location. Special inducements offered to manufacturers. Unexcelled facilities for coal and lumber and shipment by rail and water. Eighty ton Iron and Steel Rolling Mill (only one in the State) now being built. Address

THE SOUTH TACOMA COMPANY,
P. O. Box 207, Tacoma, Washington.

To Manufacturers and
Hardware Dealers.

FOR SALE.

A NOVELTY in a WEDGE for Axes and Tools with wood handles, in ten sizes. Patented, July 25th, '93. The only wedge on the market. If the handle shrinks the wedge can be driven deeper and the handle cut off flush and it will hold.

ALSO a new invention in SLIDING DOOR LATCHES, patented November 26, '89. These latches are for stable doors and gates. By turning other side up can be used as a straight gate or thumb latch. Can be made as cheap as ordinary latches.

The Wedge and Latches were ILLUSTRATED on pages 68 and 69 of *The Iron Age* of October 18th, 1894. Patents for sale or will take partner with small capital on six patents in the hardware line. Write for samples, etc.

W. H. THOMAS,
Jenkintown, Pa.

FOR SALE
HOISTING ENGINES

MANUFACTURED BY
THE JOHN F. BYERS MACHINE CO.
RAVENNA. • • • • • OHIO.
WRITE FOR CATALOGUE.

COMPLETE SET OF
Plumbers' Iron Pipe and Fitting Patterns, includes arbors, benches, flasks, &c., for sale low. Address "OWNER,"
110 Beekman St., New York.

FOR SALE.

A set of 10 inch Well Drilling Tools. Address WILLIAM N. AMORY,
Pier 18, North River, N. Y.

ADOLPH BUTZE,
Manufacturers' Agent.
Railroad, Packing House and Contractors' Supplies.

AGENT FOR—

LATROBE STEEL WORKS, Locomotive and Car Wheel Tires. UNITED RUBBER CO., Hose, Packing, &c. GEO. GRIFITHS CO., Shovels, Scoops, &c.

Corrugated Galvanized and Sheet Iron, Plate, Tank and Bar Iron, Waste—White, Colored and Wool.

Bank of Commerce Bldg. St. Louis, Mo.

EUGENE V. N. BISSELL, Auctioneer.

E. BISSELL, SON & CO.,
Successors to
HAYDOCK & BISSELL,
WHOLESALE

HARDWARE AUCTIONEERS,

19 Murray St., and 15 Park Place, N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

J. A. COLEMAN,
Author Coleman's Mechanic's Liens in Illinois
Attorney at Law,
82 Hartford Building, Chicago.

MECHANIC'S LIENS EXCLUSIVELY.

PROPOSALS for Buoys and Appendages and Mooring Chain. Office of Light-House Inspector, Third District, Tompkinsville, N. Y., October 22, 1894. Proposals will be received at this office until 12 o'clock M. on Tuesday, the 6th day of November, 1894, for furnishing to the Light-House Establishment Buoys and Appendages, and Mooring Chain, required during the fiscal year ending June 30, 1895. The articles to be furnished embrace nun, can, bell, whistling, gas, wooden spar, and ice buoys, shackles, mooring chain, ballast balls, iron and stone sinkers, etc., all of which are enumerated in the specifications attached to the form of bid which may be obtained on application to this office. Contracts will be awarded on entire numbered lots, and on each item in the miscellaneous lot. Bidders must state in the bids in the proper column the dates when the several articles will be delivered. The right is reserved to reject any or all bids, to strike out any item or items in the specifications, to waive any defects, and to require the delivery of a greater or less quantity, not to exceed one-half of any item, than the quantity stated in the specifications, at any time during the fiscal year. A clause to that effect will be inserted in the contract. Proposals will be subject to the above conditions. W. S. SCHLEY, Captain, U. S. N., Light-House Inspector, Third District.

FOR SALE.

PORTABLE STEEL RAILROAD CULVERTS; they are unique, practical, strong, cheap and just the thing to use when building ELECTRIC AND STEAM RAILROADS: they fill a long-felt want in Railroad Construction. This invention is also admirably adapted for Highway and County Road Bridges. Send for descriptive circular.

W. A. NICHOLS, Girard Building, Philadelphia, Pa.

SALESMEN ATTENTION.—We offer to salesmen, calling on the iron and wood-working trade, a remunerative line; liberal commissions; references required. Address "COMMISSION," office of *The Iron Age*, 148 Franklin St., Boston, Mass.

Machine Tools Wanted.

Either new or second-hand; if latter must be in first-class condition. One 20 in. shaper, one 24 x 24 planer, with about 8 ft. bed. Address LOCK BOX 147, New Brunswick, N. J.

FOR SALE.

Taggers Plate Squares, No. 28 Thick, 10 tons 4 in. x 8 $\frac{1}{4}$ in. 5 tons 2 $\frac{1}{4}$ lb. x 5 in. 2 tons 3 in. x 4 in. Also quantity No. 23 Sheet Iron Circles 4 $\frac{1}{2}$ in. to 9 in. dia. Address

GENERAL ELECTRIC CO.,

Lynn, Mass.

LUXURY ON WHEELS.

Solid through trains between Cincinnati, Toledo and Detroit. Pullman Vestibuled Trains between Cincinnati, Indianapolis and Chicago. Through car lines from Cincinnati via Indianapolis to St. Louis; also Cincinnati via Indianapolis to Decatur, Springfield, Ills., and Keokuk. These are the only lines running Pullman Vestibule and Dining Cars between the cities named. See that your ticket reads via Cincinnati, Hamilton and Dayton.

WM. M. GREENE, Gen'l Manager,
D. G. EDWARDS, Gen'l Passenger Agent
Cincinnati, O.

The Williams

Printing Co.,

Commercial Printers,
and Binders.

Estimates Furnished for all Classes of Work.

96-102 Reade St., - New York.

ALBANY, N. Y.

RECEIVER'S SALE

VALUABLE PROPERTY.

A Grand Opportunity to Purchase a Manufacturing Plant Cheap.

Taxes Low, Insurance Low. The Town will Offer Many Inducements.

Henry L. Smith, Receiver of the Albany Horse Nail Company, offers for a limited time at private sale, the following:

Lot, 367 ft. x 367 ft. 9 in., upon the Bank of the Hudson River, and in addition, land under water to center of channel of river. Lot contains one main building 52 ft. by 208 ft. Slate roof, wood and iron frame, solid brick floor, office and store rooms; thoroughly equipped with steam heat, independent water supply, first-class drainage. Also one brick and iron roof boiler house adjoining main building. Main building contains one compound Duplex Engine, 200 horse-power, of the very best and latest make, with all modern appliances; 200 feet of main shafting with pulleys, cups, and all complete. Boiler house contains two 100 horse-power boilers with all modern appliances.

Everything new, foundation of engine, setting of boilers and all detail thoroughly first-class.

Location just across Albany city line on the bank of the Hudson River. Dock privileges within 75 feet, and D. & H. C. Co. branch track within 60 feet of building. No cartage. Title absolute.

Property must be sold. Correspondence solicited. Receiver will give all information, and invites inspection:

Will sell separately or with the plant the following:

Large quantity of counter shafting. Foster air pump No. 2. Sturtevant blower No. 8, noiseless, with counter shaft. Grindstone and solid oak frame, stone 6 $\frac{1}{2}$ inch face and 6 feet diameter. Weight of stone 2026 lbs. Emery wheels with table. Two Superb oil tanks, designed to contain oil for fuel. Dimensions, 6 ft. diameter, 24 ft. long. Bumptead Heads, man hole, caulked inside and out. Perfectly tight and guaranteed under pressure of 30 lbs. All of the above absolutely new, never used, all in good condition. Also many miscellaneous tools, scales, &c., &c. All new.

Entire plant suitable for almost any large manufacturing. Address or call upon

HENRY L. SMITH, Receiver,

50 State Street, Albany, N. Y.

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

BY A STEAM ENGINE COMPANY in the New England States, a thoroughly competent man to take position of foreman of iron and brass foundry; must be perfectly familiar with green and dry sand, also iron work; must also understand the mixture of metals, and be used to handling men; none but a strictly reliable and temperate man need apply, giving complete particulars regarding qualifications, with whom experience has been gained, and salary expectations. Address "NEW ENGLAND FOUNDRY," office of *The Iron Age*, 96-102 Reade St., New York.

EXPERIENCED SALESMAN for New York and Pennsylvania, fully acquainted in hardware and cutlery and already having an acquaintance in both States. Address "J. G. F.," office of *The Iron Age*, 220 So. 4th Street, Philadelphia.

A FIRST-CLASS MAN to make ornamental brass, iron and metal elevator cabs and cars, also brass and iron grille work, and five men to manufacture wire work of every description; those with experience apply to Pennsylvania Wire Works, EDWARD DARBY & SONS, 235 Arch St., Philadelphia.

A MAN to do enameling; one who thoroughly understands mixing, lining and firing. Address "ENAMEL," office of *The Iron Age*, 312 The Cuyahoga, Cleveland, O.

TRAVELING SALESMAN for special territory in every State, visiting the hardware and household goods trade, who will carry our aluminum goods as a side line. Address "MANUFACTURER," office of *The Iron Age*, 59 Dearborn St., Chicago.

SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

A TRAVELING SALESMAN; has had 14 years' experience as such in hardware, iron, etc., in Northwest; best of references. Address "HARDWARE," Box 2, Lake Park, Wash.

A FOUNDRY FOREMAN of long experience and first-class qualifications will be open for an engagement end of October; thoroughly posted in cheap methods of production either in iron or steel; highest testimonials as to ability and personal character. Address "X. Y.," office of *The Iron Age*, 146 Franklin St., Boston, Mass.

HARDWAREMAN, 24 years old, seven years' experience, wishes position as clerk in store or to travel. BROWN, 638 Hoeveler St., E. E., Pittsburgh, Pa.

A SUPERINTENDENT OR FOREMAN of architectural iron work; had charge of big jobs, good rigger, derrick man and finisher; able to handle men and work according to plans; best of references. Address "E. K.," Box 11, office of *The Iron Age*, 96-102 Reade St., New York.

A SUPERINTENDENT, by man of large experience in, and thorough practical knowledge of, steam and hydraulic machinery; also mill machinery and construction work. Address "STEAM AND HYDRAULIC," office of *The Iron Age*, 96-102 Reade St., New York.

A CLERK OR SECRETARY to mechanical engineer, by man who is a practical book-keeper, good correspondent and familiar with drawings and machinery. Address "CLERK OR SECRETARY," office of *The Iron Age*, 96-102 Reade St., New York.

BY A PRACTICAL wrought iron pipe maker, who has had many years experience in the manufacturing of the same. Address "WROUGHT IRON," office of *The Iron Age*, 509-510 Hamilton Building, Pittsburgh, Pa.

AGENCY WANTED—Desire to handle the product of first-class, pushing, energetic foundry; want grey iron, brass, composition and bronze castings; will make New York headquarters if satisfactory arrangements can be made; all references given and required. Address "FOUNDRY AGENT," office of *The Iron Age*, 96-102 Reade St., New York.

BY YOUNG MAN with 15 years' experience with large manufacturing concerns of hardware, bicycles, &c., a position as superintendent or overseer; I understand fully the care and management of men; am a first-class electro plater, understanding the making and manipulation of all kinds of solutions for the electro-deposition of metals, dipping, finishing, &c.; I can furnish the best of references as to character and ability. Address "OVERSEER," office of *The Iron Age*, 96-102 Reade St., N. Y.

MAN OF EXPERIENCE in the manufacture of hardware seeks position; disengaged November 1st; understands thoroughly both iron and brass foundry in all branches. Address "METALLIC," office of *The Iron Age*, 96-102 Reade St., New York.

TO TAKE CHARGE of rolling mill or steel works machinery; have had 15 years' experience as machinist, millwright or master mechanic; can give best of references; Pittsburgh preferred. Address "MILLWRIGHT," office of *The Iron Age*, 509-510 Hamilton Building, Pittsburgh, Pa.

BY A FIRST-CLASS mechanical engineer with extensive experience on a great variety of machinery, fully familiar with best shop practice and any kind of office work, calculating, quoting prices, designing and superintending work; can build most efficient machinery at least cost. Address "RESPONSIBLE," No. 111, office of *The Iron Age*, 96-102 Reade St., New York.

BY A MECHANICAL ENGINEER, 40 years of age, with long experience in estimating, contracting and purchasing, and in the management of large business enterprises; the highest references will be furnished. Address "B. M. G.," office of *The Iron Age*, 59 Dearborn St., Chicago.

STEEL AND IRON SALESMAN; a gentleman with large experience and extensive acquaintance in the iron and steel trade desires connection with manufacturer; would travel or take charge of agency or branch house; have been traveling for five years, selling all grades of crucible, open hearth and Bessemer steel; am thoroughly practical, can work and temper any kind of steel and can bring considerable trade with me; can furnish best of references from employers and among the trade; have traveled all territory East of Mississippi River; open for engagement December 1st. Address "E. L. R.," No. 111, office of *The Iron Age*, 96-102 Reade St., New York.

A GAS PRODUCER MAN; 20 years' experience at open hearth and heating furnaces, in rolling mills. Address "GAS PRODUCER," office of *The Iron Age*, 96-102 Reade St., N. Y.

A COMPETENT, ACTIVE BUSINESS MAN with long experience as a rolling mill man,ager, wants a position; is well posted in the manufacture of plates, sheets, sections and general merchant bar iron and steel, understands how to turn out good work at lowest cost and is accustomed to purchasing all supplies. Address "R. W. A.," Box 1027, office of *The Iron Age*, 96-102 Reade St., N. Y.

ROLLING MILL.—Wanted, a position as superintendent or assistant; thoroughly posted in mill practice, iron or steel, and economical management of help; pushing and energetic; best of experience in Northern mills. Address "NORTHERN MILLS," office of *The Iron Age*, 96-102 Reade St., New York.

BY A THOROUGHLY experienced hardware and implement man; first-class salesman and stock keeper; can manage store and do the buying if necessary; have had four years' experience on the road; would make contract with a good firm; good references. Address L. W. VIVION, 131 Emma St., Dallas, Texas.

SUPERINTENDENT OR CHIEF ENGINEER, by mechanical engineer of large and varied experience in hydraulic machinery, structural work in iron and steel, installation of plants, transmission of power, cranes, etc.; thoroughly conversant with modern methods of construction and shop practice. "MODERN METHODS," office of *The Iron Age*, 96-102 Reade St., N. Y.

A SUPERINTENDENT of any new industry requiring inventive ability to develop and executive ability to successfully manage; would accept portion of salary in the shape of stock in a small paying business. Address "NEW INDUSTRY," office of *The Iron Age*, 96-102 Reade St., New York.

A TRAVELING SALESMAN; prefer heavy hardware; good references. Address Box 10, Pomfret, Conn.

A GENTLEMAN of extensive business experience with one of the largest manufacturing concerns in the United States, would like to open correspondence with reliable parties in need of a capable man for position of trust and responsibility; unqualified references can be furnished from former employers and the leading bankers and business houses in the city where he resides. Address "CUSHMAN," No. 1011, office of *The Iron Age*, 96-102 Reade St., New York.

BY COMPETENT MAN of 20 years' experience as patent furnace builder and producer of patent steel wire, or as superintendent of wire mill; fully competent to hire and manage help; can refer to last place, where I had charge of patenting and wire drawing. Address "FURNACE MAN," office of *The Iron Age*, 96-102 Reade St., New York.

SALESMAN wants to hear from manufacturers or others in hardware or kindred line wishing to engage traveler after the first of the year; expenses and salary or expenses and commission, or would carry a line for expenses only with privilege of side line; reliable man; can give good references. "SALESMAN," office of *The Iron Age*, 220 So. 4th St., Philadelphia.

A YOUNG MAN, age 33, married, one child, having eighteen years' experience in the hardware business, desires a position where intelligent labor combined with strict attention to business will be recognized and rewarded; will furnish references. Address "SIMPLEX," office of *The Iron Age*, 96-102 Reade St., New York.

A MAN of large experience in the hardware and cutlery business will be at liberty Sept. 1st to make an engagement with a view to permanency; is well acquainted with Western trade and can in good times influence a large volume of it; would accept an engagement east of Chicago in any good field, representing general trade or specialties; references first class in every particular. Address "WESTERN TRADE," office of *The Iron Age*, 96-102 Reade St., N. Y.

THE LATEST BOOKS.

Farrion System of Correspondence and Business Forms; for use in common schools, high schools, normal schools, business colleges, academies and self-instruction. By J. W. FARR. 114 pages, cloth. \$1.00

Practical Handbook of Drawing for Modern Methods of Reproduction. By C. G. HARPER. 161 pages, illustrated, plates, cloth. \$2.50

A Text-Book on Roads and Pavements. By F. P. SPALDING. 213 pages, illustrated, cloth. \$2.00

A Text-Book of Ore and Stone Mining. For the use of the owners, mine managers, prospectors and all interested in ore and stone mining. By CLEMENT LE WAVE, FOSTER, D.Sc., F.R.S., Professor of Mining, Royal College of Science; H. M. Inspector of Mines. With 700 illustrations, large 8vo. \$10.00

The Architect's Directory for 1894. Containing a list of the architects in the United States and Canada, classified by States and towns together with index of prominent dealers in and manufacturers of building materials and appliances. \$1.00

Theory and Practice of Design. An advanced text-book on decorative art. By FRANK G. JACKSON. Illustrated, cloth. \$2.50

Qualitative Analysis. For use in instruction in chemical laboratories. By LUDWIG MEDICUS. Translated by J. MARSHALL. Cloth. \$1.50

Select Methods in Chemical Analysis (chiefly inorganic). By W. CROOKES. Third edition, rewritten and enlarged. 710 pages, illustrated, 8vo, cloth. \$8.00

Descriptive Catalogue of Essential Oils and Organic Chemical Preparations. Compiled by F. B. POWER. 96 pages, 8vo, boards. \$1.00

Farrion System of Bookkeeping; for use in common schools, high schools, normal schools, business colleges, academies and self-instruction. By J. W. FARR. 100 pages, cloth. \$1.00

Farrion System of Business Arithmetic; for use in common schools, high schools, normal schools, business colleges, academies and self-instruction. By J. W. FARR. 350 pages, cloth. \$1.00

How to Build Dynamo-Electric Machinery. Embracing theory designing and the construction of dynamos and motors, with appendices on field-magnet and armature winding, management of dynamos and motors, and useful tables of wire gauges. By E. TREVERT. 339 pages, illustrated, cloth. \$2.50

How to Become a Successful Electrician. The Studies to Be Followed, Methods of Work, Fields of Operation and Ethics of the Profession. By T. O'CONOR SLOANE. 16mo, cloth, illustrated. \$1.00

The Engineer's Year Book of Formulas, Rules, Tables, Data and Memoranda in Civil, Mechanical, Electrical, Marine and Mine Engineering. By H. R. KEMP. 700 illustrations, 8vo, cloth. \$3.20

Elementary Metal Work. A practical manual for amateurs and for use in schools. By C. G. LELAND. 111 pages, 4to, cloth. \$1.50

Refuse Destroyers, with Results Up to Present Time. A Handbook for Municipal Officers, Town Councillors and others interested in Town Sanitation. By CHARLES JONES. With a paper on the utilization of town refuse for power production. By THOMAS TOMLINSON. 8vo, cloth, 2d and revised edition. \$2.00

Practical Instructions in Quantitative Assaying with the Blowpipe. By E. L. FLETCHER. 142 pages, morocco, \$1.50; cloth, \$1.25

The Metallurgy of Gold. By T. KIRKE ROSE. 462 pages, illustrated, cloth. \$6.50

The Mineral Industry, Its Statistics, Technology and Trade in the United States and other Countries. From the earliest times to the end of 1893. By R. P. ROTHWELL. Vol. II. 4to, cloth. \$6.00

The Animal as a Machine and a Prime Motor and the Law of Energetics. By R. H. THURSTON. 12mo, cloth. \$1.00

The Practical Application of Dynamo-Electric Machinery. By C. K. MACPADDEN and W. D. RAY. 187 pages, illustrated, cloth. \$1.00

An Introduction to the Study of Metallurgy. By W. C. ROBERTS AUSTEN. Third edition, 379 pages, illustrated, cloth. \$4.00

Sent, post-paid on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 READE ST., NEW YORK.

WE WANT TO SELL
TWO PAIRS

WORTHINGTON COMP. COND. PRESS. PUMPS.

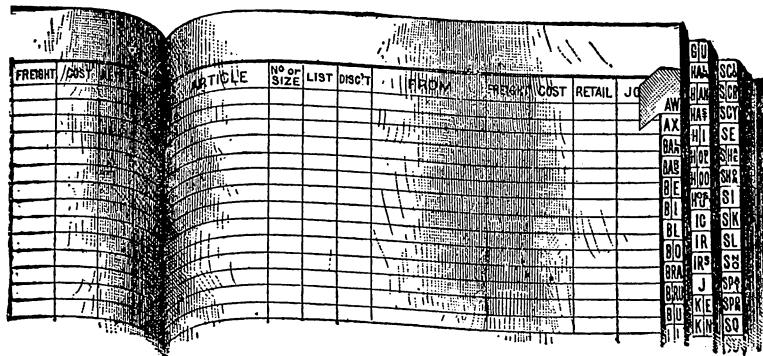
COMPLETE WITH CONDENSER. USED BUT LITTLE. DISPLACED BY LARGER ONES.

THE U. S. PROJECTILE CO.,

First Ave. and 53d St., Brooklyn, N. Y.

The Iron Age Hardware Price Book E.

SECOND EDITION, REVISED AND ENLARGED, WITH MULTIPLE INDEX (Patent Pending).



AD GU SC
AN HAL SCR
AU HAN SCY
AW HAS SE
AX HI SHA
BA HOL SHO
BA HOO SI
BE HOS SK
Fac-Simile of Indexing.

SIZE.—The book is 7 x 10 inches (much larger than Price Books A, B, C, or D), 250 pages.

PAPER.—The paper is the celebrated Crane's heavy ledger paper, tough and strong, permitting frequent changes and erasures.

BINDING.—The binding is of the very best quality—flexible sea grained leather.

INDEX.—By means of the arrangement shown in the cut the index applies to every page (except Supplement) and permits reference to any article at a single motion. This greatly facilitates the use of the book, avoiding the troublesome turning from page to page which is necessary in connection with other Price Books. It has been prepared with great care, and it is believed that it provides a place for every article in the Hardware line.

ARRANGEMENT.—The book is arranged to keep a complete record of prices on a single page, the width giving sufficient room.
SUPPLEMENT.—A 40-page Supplement is provided to give room for supplemental quotations, memoranda, tables, &c.

THIS BOOK IS ISSUED IN ONLY ONE EDITION, PRICE, \$5.00.

Advantages of Multiple Index Price Book.

A SPECIAL feature of the books is the arrangement of the index characters, which, instead of being alphabetical, are arranged with special reference to the classification of Hardware goods, each index character giving the first two or three letters of the names of Hardware articles, as shown above. The ease and convenience with which the books can be used is indicated in the following examples, taken from Book F:

For Augers,	turn to	AU	For Chisels,	turn to	CH	For Iron,	turn to	IRO
" Parers, Apple	"	PAP	" Cutlery,	"	CUT	" Irons,	"	IR'S
" Saws,	"	SAW	" Cartridges,	"	CAR	" Shovels,	"	SHO
" Pumps,	"	PUM	" Rules,	"	RUB	" Grindstones,	"	GRI
" Bits,	"	BIT	" Locks,	"	LO	" Stones,	"	STO

Special care has been taken to make the classification as indicated in the index correct and comprehensive, making provision for all Hardware articles and giving sufficient space for the keeping and recording of prices. It is thought that every strictly Hardware article has its first two or three letters given, thus permitting immediate reference to it by a single motion.

It is, however, obvious if any articles are not directly designated by the index characters, that the index, being alphabetical in its arrangement, indicates the place where quotations on such articles should be recorded. The supplement, however, may be found useful for quotations on any outside goods which the Hardwareman may desire to keep prices on, while at the same time it may be used if necessary for any overflow of matter from the preceding pages, or to contain list prices or other matter relating to goods.

Hardware Classification.—A pamphlet containing a classification of the leading Hardware articles is furnished with the price books.
Standard Lists—In connection with these price books a set of *The Iron Age* STANDARD HARDWARE Lists can be used with great advantage. Price 25 cents.

These price books, which have been prepared by R. R. Williams, Hardware Editor of *The Iron Age*, are presented to the attention of Hardware men in the confidence that they will be found a most valuable aid in keeping track of prices.

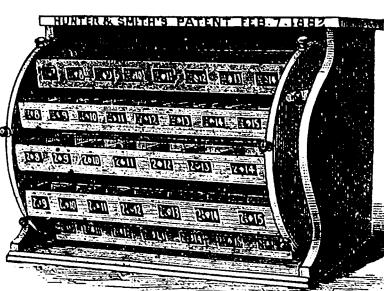
Sent, Post-paid, on Receipt of Price, by

DAVID WILLIAMS, Publisher, - 96-102 Reade St., New York.

Screw and Bolt Cases.

Practical, Durable, Convenient, Neat, Low Priced. Screw Case holds 89 gross. Bolt Case 55 sizes. Can be set on counter or ledge in she ving. We also make a Combination Case that holds 63 gross of screws and 28 packages of bolts, just what the average dealer wants. Write for trade price.

THE SMITH BROS. HDW. CO., Columbus, O.



Eclipse Shoe Stands and Lasts.



Reversible and Common Shoe Lasts.

Lap Lasts, Shoe Rests, &c., &c.

Patented May 1st, 1894.
For Prices and Circulars address

John C. Kupferle,
ST. LOUIS, MO.

Collections?

ATTENTION! Merchants and Manufacturers.—We collect your past due accounts. Do not let them remain too long upon your books. Send for our draft book.

THE HARDWARE BOARD OF TRADE, Ltd.
4 and 6 Warren street, New York.
JAS. H. GOLDEY, Treas.

Standard Scale and Fixtures Co.,

DEALERS IN AND JOBBERS OF

Standard Scales, Warehouse Trucks, Baggage Barrows, Wheelbarrows, Car Movers, Money Drawers, etc., etc.

Standard Scale & Fixtures Co.,
821 North 3d Street and 818 North 4th Street,
ST. LOUIS, MO.

The entire North American Continent, notwithstanding the widely diversified interests of its population, numbering perhaps seventy-five millions, furnishes me with but two classes from whom clients may be sought, viz.: THE SATISFIED AND THE DISSATISFIED.

Those who, from a careful and constant observation of the advertising methods pursued by competitors, whose success is notorious, become SATISFIED—that their own efforts in that direction might gain materially by radical departures from the stereotyped and commonplace.

OF THE DISSATISFIED:

Such as become so by reason of being fully aware that their advertising matter is by no means what it might be, nay! what it must be, to avoid being submerged by the conspicuous enterprise of others in their own line of business. Under which of these two classes do you find yourself?

FRANCIS I. MAULE.

EX-Perter

has been defined—by some incendiary: “One who is prepared to prove anything for a satisfactory consideration.” Co-incidentally, it is a significant fact that the SELF-CONFESSED “ADVERTISING EXPERT” has recently become extinct, and gives promise of remaining so. The quondam “Expert,” with a unanimity worthy of note, now limits his claims to simple OMNISCIENCE, or to a felicitous blending of OMNISCIENCE with OMNIPOVENCE. For obvious reasons I am not an “Expert,” while a very mild type of OMNISCIENCE will instantly recognize the absurdity of any claims I might advance to such an attribute.

Treating of Advertising matters, I have issued two publications—rather more perhaps than circuitously, considerably less than books, neither of them works of genius, both of them obviously and avowedly FINITE. Both will be mailed to those whose longing for light would seem to warrant the sending of five 2-cent Postage Stamps to the subscriber.

FRANCIS I. MAULE, 330 Chestnut Street, Philadelphia.

Page 65 of this paper presents a sample of my work.

FRANCIS I. MAULE, 328 Chestnut St., Philadelphia.

ANNOUNCEMENTS, FOLDERS, TRADE PRIMERS, NOTICES, and so on “Ad infinitum.”

Having been engaged in a mechanical business for thirty (30) consecutive years, I have in that period acquired a general knowledge of Machinery, Tools and Mechanical Appliances, especially hardware, steam-fitters, plumbers, and engineers’ tools and supplies. This experience enables me to readily apprehend the desirable features of such goods, and in the preparation of advertising matter to present their claims from the standpoint of a trained appreciation.

NEWSPAPER AND PERIODICAL ADVERTISEMENTS, TRADE CIRCULARS, PRICE LISTS, CATALOGUES, CIRCULAR LETTERS,

MENTION THIS NUMBER OF IRON AGE.

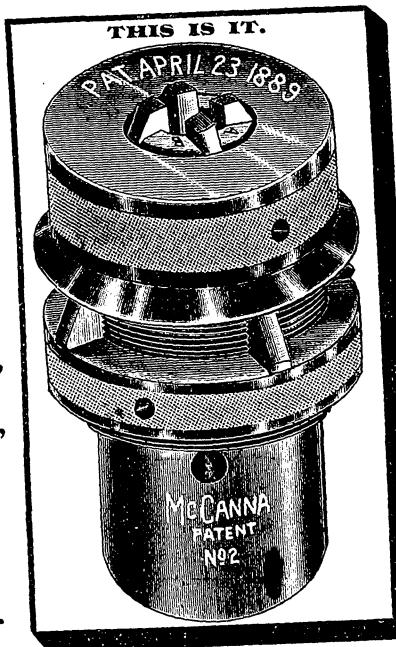
It Cuts-Costs

—Cuts them by greatly reducing the cost of all such work as is turned out with Turret Machines of any type—such work as Studs, Pins, Screws, Bolts—in short, the endless variety of small pieces for which manufacturers look to their Turret Machine.

McCanna's Patent Adjustable Thread-Cutting and Milling Tool

DOES

Thread Cutting,
Milling,
Counter-Boring,
Facing,
Cutting Tapers,
Pointing,
and General Brass
Finishing
and Machine Work.



DOES THIS
AND DOES IT WELL

—ON—
Steel, Copper,
Iron, Fibreoid,
Brass, &c., &c.

This tool is self-centering and quickly adjusted to any size within its range, which, for a set of three mills, would represent no less than

96 Solid Milling Tools.

Think of it, 96! of the usual type, as such a set will mill or thread from $\frac{1}{64}$ to $1\frac{1}{2}$ inches inclusive, and when you consider this its saving (provided it is a reliable tool) is as clear as the noonday sun.

The Adjustable Thread-Cutting and Milling Tool

is not costly; is absolutely simple in construction, and uses Cutters that may be ground repeatedly—Cutters which can be removed and replaced instantly, and of which the cost of new ones is but trifling. The absolute maintenance of standard sizes of work turned out is guaranteed by its makers for the McCanna Milling Tool, which is fully warranted in every respect, and each one carefully tested before leaving our hands. Their design is so simple that there is nothing about them to get out of order, and they may be entrusted to boys and unskilled workmen, who cannot seriously injure them.

The McCanna Milling Tool is warranted to stand up "to its work" as well, and to carry as heavy a cut, as the best types of solid milling tools extant.

And now just one more thing:

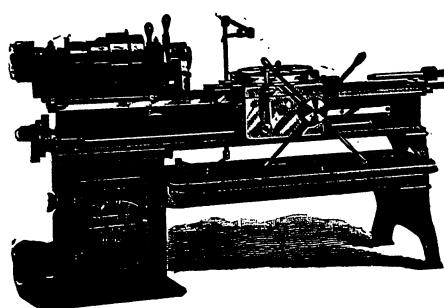
Of course, anything as good as this Mill has a Price List, giving its "whys" and "wherefores" in detail. If you are inclined to believe from what we have above said that this tool might be able to save you some money in the running of your Turret Machines, we shall be pleased to exchange our said Price List for a postal card asking us to send it to the address you give.

The Taylor-Rice Engineering Co.,

Please Address
Box 249.

WILMINGTON, DEL., U. S. A.

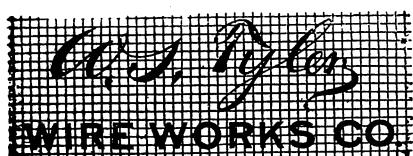
F



HAVE YOU A
FLAT TURRET LATHE ?

If not send for

RAPID LATHE WORK.
JONES & LAMSON MACHINE CO.,
SPRINGFIELD, VT., U. S. A.



MANUFACTURERS OF
**Light Architectural Iron
and Wire Work.**

GRILLS OF EVERY DESIGN,
In Brass, Iron and Steel, Electroplated, Oxidized and Berlin or Rustless Black.
W. S. TYLER, Pres. PROCTOR PATTERSON, Sec. & Treas
CLEVELAND, OHIO.

LABORATORIES OF
DR. GIDEON E. MOORE,
221 Pearl St., New York.

DEPARTMENT OF CHEMISTRY. Analyses and Assays of Ores, Metals, Waters, Fuel, Oils and Natural and Industrial Products of every description.

DEPARTMENT OF PHYSICAL TESTS. Chas. F. McKenna, Director. Tensile, Transverse and Compression Tests of Iron, Steel and other Metals and Alloys, Cements, Building Stones and Engineering Materials generally. Tests of Lubricating Value of Oils, etc., etc.

PRINTED PRICE-LISTS ON APPLICATION.

The Pittsburgh Reduction Co.
Pittsburgh Office, 701 Ferguson Block,
119 Third Ave., Pittsburgh, Pa.
New York Store, 4 Havemeyer Building, Cor. Church and Dey Sts., N. Y.

ALUMINUM
Ingots, Plates, Bars, Sheets,
Wire, Tubes and
Castings.

—:THE:
HENDEY-NORTON LATHE

Is a Modern Machine Tool Its Improvements are Practical and Simple, making it the most Useful, Convenient and Economical Engine Lathe made.

FEEDS.

All the feeds in daily use can be obtained by the simple movement of a lever.

THREADS.

All the threads to be cut in ordinary daily use can be cut by simple movement of a lever.

REVERSE in APRON.

Enables the operator to cut threads WITHOUT touching the countershaft lever, allowing Spindle to run continuously in one direction. No Slamming of Counter Shaft or strain of belts in REVERSING Spindle.

AUTOMATIC STOP.

It Automatically stops the Carriage in EITHER direction when feeding or thread cutting, removing all danger of running into the shoulders in turning or thread cutting, in BOTTOM of holes or internal thread cutting. It is especially valuable in DUPLICATING pieces.

Buy the Best. Send for Catalogue.

The Hendey Machine Co., Torrington, Conn.

EUROPEAN AGENTS :

SCHUCHARDT & SCHUTTE, Berlin. CHAS. CHURCHILL & Co., London.
EUGEN SOLLER, Basel, Switzerland.

FOR CYLINDER BORING MACHINERY,

—WRITE TO—

The Newark Machine Tool Works,
NEWARK, N. J.

CLAMP, * * *

CLAMP,

CLAMP.

THE STEARNS STEEL BAR CARPENTERS' CLAMP.



IT HOLDS.

The strongest, most powerful, most convenient and best finished.

Lengths, 3, 4, 5, 6, 7, 8, 9, 10 foot.

E. C. Stearns & Co., Syracuse, N. Y.

JUST OUT.

KITCHEN BOILER CONNECTIONS

—A SELECTION OF—

Practical Letters and Articles Relating to Water
Backs and Range Boilers.

Compiled from THE METAL WORKER.

71 Illustrations, 8vo, 140 Pages, Cloth, Price, \$1.00.

The Plumbing and Letter Box departments of *The Metal Worker* have contained many articles on the work of setting range boilers and overcoming the difficulties commonly encountered. The extensive correspondence that the discussion of these topics has called forth indicates the widespread interest that they attracted, and the letters coming from all parts of the country and from practical men, who have written from their personal experience, constitute a most valuable source of information. The descriptions are plain, and the illustrations add all that is required to make them clear and comprehensive.

These articles have been carefully edited and are now embodied in a book, which is divided into two parts, the first on water backs and boilers and their connections, and the second on heating rooms from range boilers.

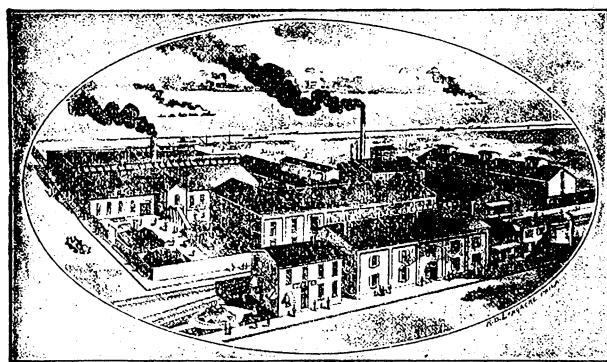
The main divisions of the volume are as follows: Water Backs and Their Construction; Boiler Construction, Operation and Connections; Circulating Pipes; Multiple Connections; Double Boilers; Difficulties Met in Every Day Practice; Relief Pipe and Vacuum Valve; Horizontal Boilers; Miscellaneous; Heating Room from Kitchen Boiler; Radiators Heated from Coils in Stoves.

Sent, post-paid, on receipt of price, by

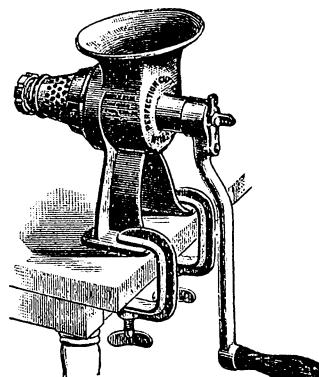
David Williams, Publisher and Bookseller,
96-102 Reade Street, New York.

WHITE MOUNTAIN FREEZERS.

THE
BEST
FREEZER. Heavy Waterproof Tubs. Cans of Charcoal Tin-plate. Malleable Iron Dashers. All inside parts tin-plated. Gearing completely covered.
Inquire of any leading Jobber or write us. THE
BEST
SELLER.
The White Mountain Freezer Co., Nashua, N. H.



• • • •
THE LATEST, BEST, MOST PRACTICAL,
AND IMPROVED FOR FAMILY USE.
Simple to use. Easy to clean.
Of few parts.
Requires no repairs.
Easily put together and taken
apart.
No parts to wear out or become
dull.
Does not mash or grind meats,
etc.
All parts coated with pure black
Tin.



THE NEW . . .

1894 PATTERN.

Perfection . . . CUTTER.

Manufactured by

NORTH BROS. MFG. CO.,
PHILADELPHIA, PA.JOHN H. GRAHAM & CO., Mfrs. Agents,
113 Chambers St., New York.

COVERT'S VICTOR WAGON JACK



Has no equal. The lever power is enormous. Only one size required, as it adjusts itself to and will lift with ease the lightest carriage or heavy truck. Weighs only 7½ lbs. Has straight lift and will not tilt. Being made of iron it is indestructible.

The Price is the Lowest.

We are headquarters and
No. 300. the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

Covert's Saddlery Works,
FARMER, N. Y., U. S. A.

1895

Columbia
Bicycles

\$100.

Can You Sell Columbias?

MECHANICS



DIPLOMAS AWARDED. Courses in other trades, all including thorough instruction in Mathematics and Physics. Send for FREE Circular, stating subject you wish to study, to The Correspondence School of Mechanics, Scranton, Pa.

THE NEW . . .

Manufactured by
NORTH BROS. MFG. CO.,
PHILADELPHIA, PA.

THE WM. A. CLARK PATENT EXPANSIVE BIT.



W.A. CLARK'S PATENT.



TWO SIZES { Small size Bores from $\frac{1}{2}$ in. to $1\frac{1}{2}$ in.
Large " " " $\frac{3}{4}$ in. " 3 in.

SPECIAL CUTTERS: No. 5—For Large Bit, Bores from 3 in. to 4 in. No. 6—For Large Bit, Bores from 4 in. to 5 in.

Stock and workmanship superior to all others. Every part interchangeable.
Quality guaranteed. For sale by all Hardware Dealers.

Manufactured by R. H. BROWN & CO., New Haven Conn.

You can't risk on the quality.
We make only the best!



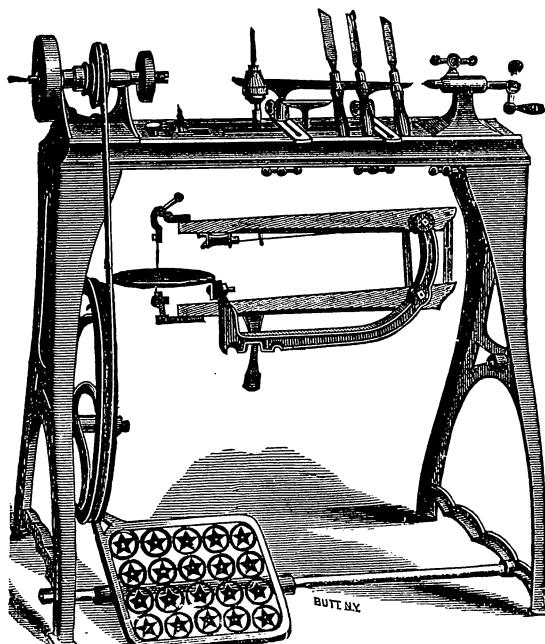
Sand Papers { Flint Paper
Garnet Paper
Emery Paper
Emery Cloth
in Reams and Rolls

HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

BAEDER, ADAMSON & CO.

730 MARKET STREET, PHILADELPHIA.
67 BEEKMAN STREET, NEW YORK.
143 MILK STREET, BOSTON.
182 LAKE STREET, CHICAGO.

HOLIDAY GOODS.



Many kinds of Scroll Saws have been put on the market by ourselves and other manufacturers during the past twelve years. Of these only a few have proved good enough to remain in demand. The call now is for a well-made, practical machine, and all second-class ones are of slow sale.

Those who want a good Lathe with Scroll-Sawing Attachment and all Tools and Improvements to the very latest moment will buy the Goodell Lathe.

Those who want only a Scroll Saw with Drilling Attachment and Rubber Blower will prefer the Rogers Saw.

These two machines are taking the place of all others, and are now the most in demand throughout the world.

No dealer can make a mistake by laying in a stock of them. About Christmas time they are wanted in every town, and will make business lively at this otherwise dull season.

We also keep a full stock of Designs, Wood, and all other Scroll Sawing goods.

Price of Goodell Lathe, complete, \$12.00.

Price of Rogers Saw, complete, \$3.50.

MILLERS FALLS CO.,

93 READE ST., NEW YORK.

Palmer's Common Sense Frame Pulley.

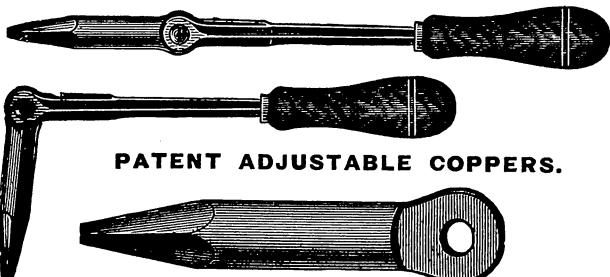


MANUFACTURED BY

PALMER HARDWARE MFG. CO., Troy, N.Y.

Covert Pat. Adjustable Soldering Irons & Coppers

It is a complete tool in every respect, and can be as easily adjusted at angle while hot as cold. The handle can be used indefinitely, as when the copper is worn out it can be replaced in the same handle, making the iron as good as new at about half the cost of the ordinary soldering iron.



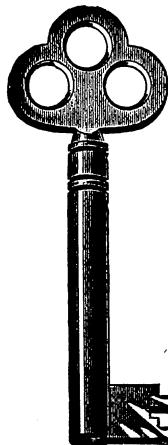
A sample of $\frac{1}{2}$ in. soldering iron will be sent by mail, free of postage to any address, on receipt of sixty cents (60c).

FOR SALE BY ALL GENERAL HARDWARE AND PLUMBERS' SUPPLY HOUSES.

COVERT MFG. CO. - West Troy, N.Y.

CABINET LOCKS

OF EVERY KIND.



DRAWER LOCKS,
CUPBOARD LOCKS,
WARDROBE LOCKS,
CHEST LOCKS,
DESK LOCKS.



A complete line of more than 1000 list numbers exclusive of our old and complete line of

YALE CABINET LOCKS.

THE YALE & TOWNE M'F'G CO.,

STAMFORD, CONNECTICUT.

New York. Chicago. Philadelphia. Boston. Pittsburg. San Francisco.

The only question is
Is it Le Page's?

If it is you have made a sale. HUNDREDS of THOUSANDS of PLEASED and SATISFIED CUSTOMERS testify to the merits of

~LE PAGE'S LIQUID GLUE.~

If you sell it you do not have to WASTE ANY TIME in answering questions as to its quality.

The people KNOW that LE PAGE'S GLUE is the BEST. They have used it for years and have proved our claims to be true.

It is the only Glue made WITHOUT ACIDS.

A dealer who regards his time as worth anything will not risk losing his CUSTOMERS' CONFIDENCE by trying to sell something which is CLAIMED to be "just as strong" and "just as good as LePage's."

Don't let your customers go to another store for what they want, but SELL THEM WHAT THEY ASK FOR.

We can furnish original and attractive advertising matter for "LE PAGE'S GLUE" upon request.

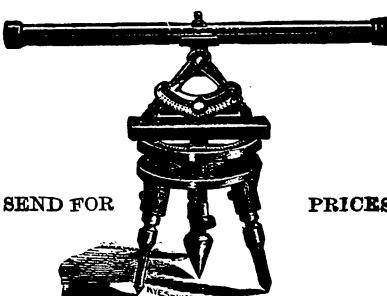
SEND FOR CIRCULARS AND PRICE-LIST.

RUSSIA CEMENT CO., Gloucester, Mass.

NEW YORK OFFICE, 95 Reade and 113 Chambers Streets.

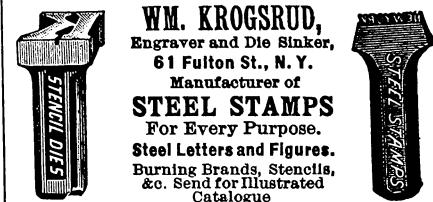
PACIFIC COAST OFFICE, 23 Davis St., San Francisco, Cal.

ARCHITECTS' & CARPENTERS' TRANSIT,



SEND FOR PRICES.

O. F. RICHARDSON & SON, Athol, Mass.
Manufacturers of Iron Levels
and Leveling Instruments.



WM. KROGSRUD,
Engraver and Die Sinker,
61 Fulton St., N. Y.
Manufacturer of
STEEL STAMPS
For Every Purpose.
Steel Letters and Figures.
Burning Brands, Stencils,
&c. Send for Illustrated
Catalogue

This is the "SALEM" HANGER,

A BRAND NEW
ARTICLE OF
"BUILDERS'
HARDWARE,"
AND WE WANT THE HARDWARE TRADE TO WRITE
US FOR SAMPLE AND PRICES.

Write us for Sample.

The W. A. South Co., Salem, Mass.

On account of the lower rate of duties under the new tariff we are now prepared to furnish all sizes at greatly reduced prices, which we shall be glad to quote on application.

Remember we are the sole importers of the genuine Trap. All others are flimsy and worthless imitations.

BURDITT & WILLIAMS, Boston, Mass.

W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries;

Fig. 209.

Fig. 381.

Fig. 145.

or wherever it is desired to raise a large quantity of water by
hand power.

The pump has large valves (accessible by hand), and will pump water
containing sand, gravel, sewage matter, &c., without choking or any
perceptible wear.

CAPACITY

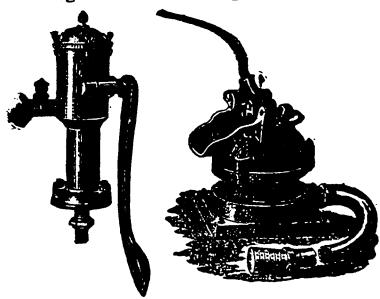
from 3,000 to 4,500 gallons per hour.



C. I. Grindstone Frame.

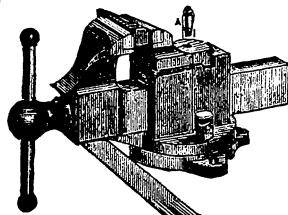
These pumps are simple, durable and low priced.
Made either as shown in cut for Hose or for IRON Pipe Suction
underneath.

Send for Circular and Price List.



PRENTISS' PAT. VISES.

The Leaders for 20 Years.

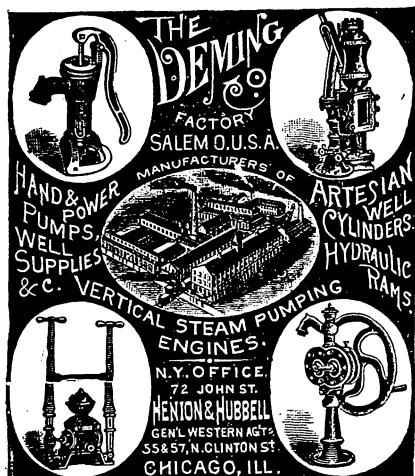
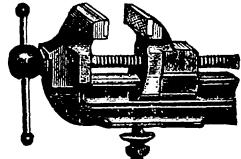


Send for Illustrated Catalogue
of

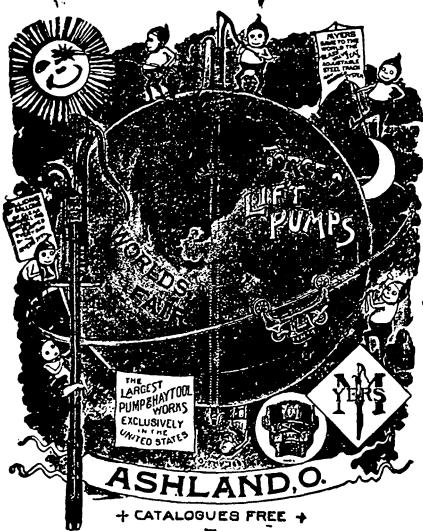
ALL KINDS OF VISES.

PRENTISS VISE COMPANY,
MANUFACTURERS,

44 Barclay St., New York.



F.E. MYERS & BRO.



Ashland Pump and Hay Tool Works.

The New York Safety Dumb Waiter.
"The Manhattan Dumb Waiter."
"The Improved Humphrey Hand Elevator."
Made specially to be sold by Hardware Stores.
Thousands in use. Catalogues on application.

THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.

PENINSULAR ALL-ROUND SHOVELS

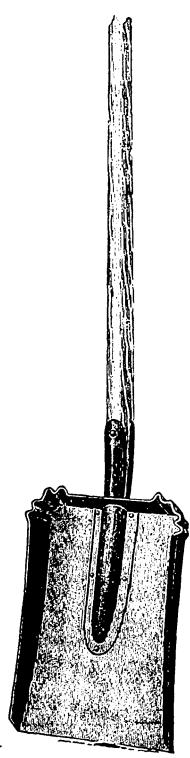
SPECIALLY ADAPTED FOR USE IN
THE FURNACE ROOM.

The larger sizes make excellent snow and barn
shovels. Best Quality Steel.

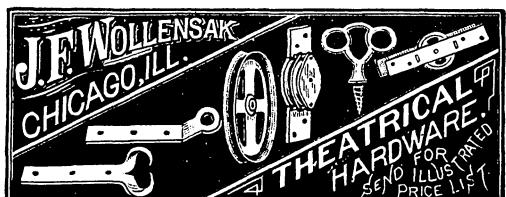
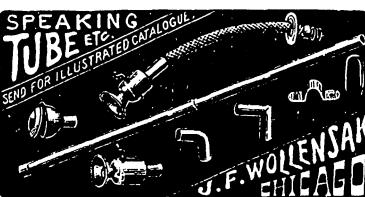
DOUBLE EDGE—CORNERS FOUR PLY.

Long-handled, light, stiff and shapely. The lightest
Steel Furnace Shovel made, at the same time very stiff
and durable. The only shovel on the market the proper
shape both for handling coal and for taking up ashes.
Can be used for any purpose for which any other shovel
is commonly used. Prices much lower than any other
shovel used in the furnace room. Three sizes:

No. 10, 8½ x 15.
No. 15, 9½ x 15.
No. 20, 10½ x 15.

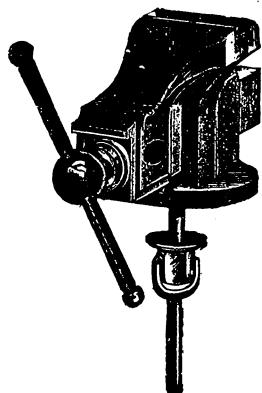


Peninsular Metal Works,
Detroit, Mich.





Athol Machine Co.,
Selling Agents.



HOLLANDS'
OFFSET JAW
VISE.

Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

Hollands Mfg. Co.,
ERIE, PA.
Manufacturers all
styles VISES.

Red Jacket
Mfg Co.

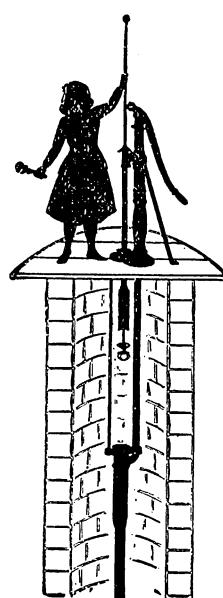
DAVENPORT
IOWA, U.S.A.

Manufacture the

Only Pump

in the U. S.
that works easily in
wells of any depth, and
can easily be fixed by
any one with a monkey
wrench without taking
the pump from
well or tearing up the
platform.

WRITE FOR PRICES.



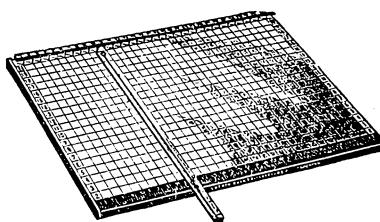
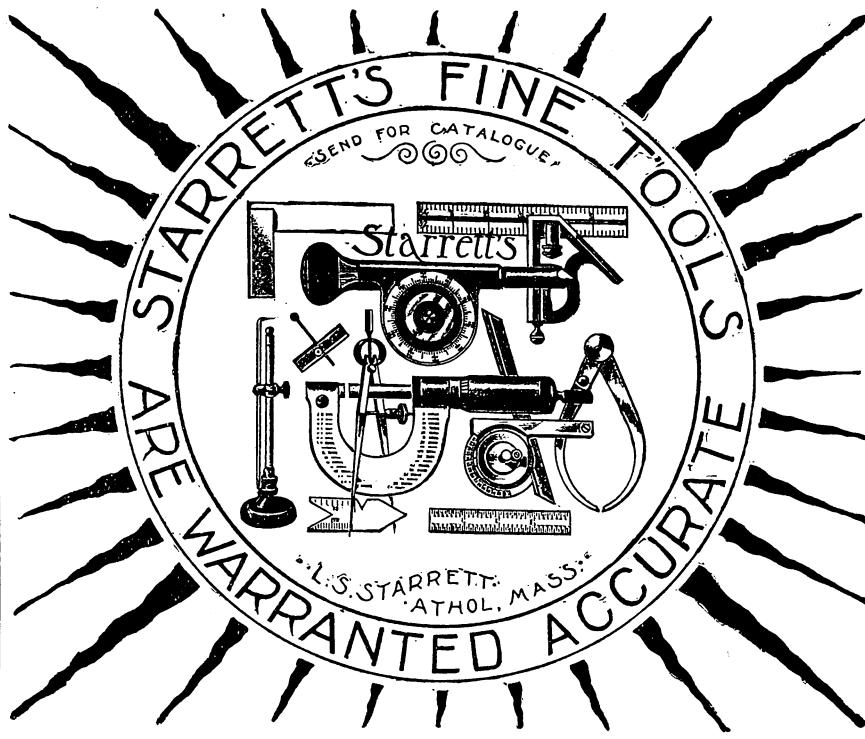
Chas. Millar & Son,
General Eastern Agts.,
UTICA, N.Y.

FINE Bronze Metal Hat and Coat
Hooks, Rail Brackets, Push Buttons,
Sash Sheaves, Drawer Pulls, Door
Butts, Sash Fasts, Extension Rules, Chest
Trimmings, etc., at right prices.

Send for Catalogue.

RANSON HARDWARE CO., Burlington, Vt.

CHAS. W. HOEFIC,
ENGRAVER AND DIE SINKER,
52 FULTON ST., N. Y.
STEEL STAMPS,
BRASS DIES, BURNING BRANDS, &c.
Designs on Steel Finely Executed.



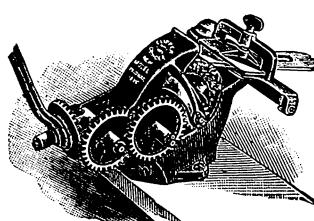
The PERFECTION GLASS BOARD.

The best, most complete, most durable
and most convenient Glass Cutting
Board in the market. It is indispensable
to any retailer of window glass, and will save its cost in a very short time.
Send for descriptive circular and price.

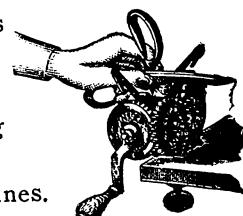
LUFKIN RULE CO., Saginaw, Mich.

New York Office, 2½ Murray Street.

CLIPPER GRINDERS.



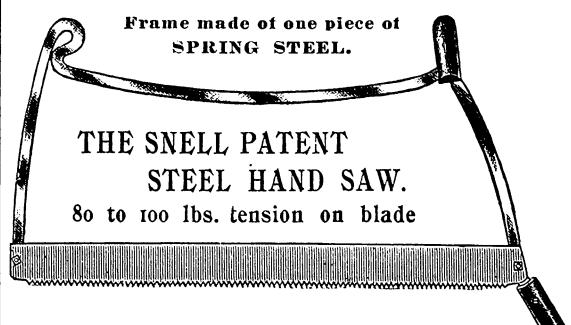
We make five sizes, Nos.
1, 2, 3, and 5.
No. 1 for joiners' use.
Nos. 2 and 3 for grinding
scissors and knives.
Nos. 4 and 5 power machines.



SEND FOR SPECIAL CIRCULAR TO

THE A. J. TRACY CO., Lim.

18 Cliff St., New York, N. Y.



Frame made of one piece of
SPRING STEEL.

**THE SNELL PATENT
STEEL HAND SAW.**

80 to 100 lbs. tension on blade

This saw is always
ready for use. Never
has to be adjusted after
blade is put in. Will
last a life-time.

Send for Descriptive Circular
and Prices to

Butler Mfg. Co.,
P. O. BOX 2180,

BOSTON, MASS.

WILL NOT BEND NOR BREAK.

FACTORY, 330 to 338 First Street, So. Boston.

Geo. N. CLEMSON, Pres.

S. S. BATTIN, Vice-Pres.

ROBERT J. JOHNSON, Treas.

F. B. EARLE, Sec.

THE NATIONAL SAW CO., OPERATING

Wheeler, Madden & Clemson Mfg Co., Woodrough & McParlin, Richardson Brothers, Harvey W. Peace Co., Monhagen Steel Works, Woodrough & Clemson, Pennsylvania Saw Co.

SEND FOR PRICE-LIST.

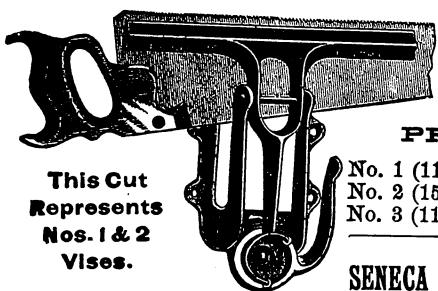
GENERAL OFFICE:
NEWARK, - - New Jersey.

SAWS

WENTWORTH'S PATENT NOISELESS SAW VISSES,

WITH RUBBER CUSHIONED JAWS.

Prevent all vibration and render Saw Filing noiseless.
Will make no more noise than Filing on a Solid Piece of Iron.



This Cut
Represents
Nos. 1 & 2
Vises.

PRICE LIST.

	PER DOZ.
No. 1 (11 inch Jaws),	\$15.00
No. 2 (15 inch Jaws),	21.00
No. 3 (11 inch Jaws),	18.00

LIBERAL DISCOUNT TO THE TRADE.

LONGEST JAWS, HEAVIEST AND
BEST FINISHED.
Sold by all leading jobbers of general Hardware at Factory Prices.



No. 3 Vise.

—MANUFACTURED BY—
SENECA FALLS MFG. CO., 265 Water St., Seneca Falls, N. Y.

E. C. ATKINS & CO., Indianapolis, Ind.

BRANCH HOUSES:
Memphis, Tenn.
Chattanooga, Tenn.
Minneapolis, Minn.

Circular, Band, Cross-Cut and Hand Saws.

Diamond.
Rex.
American.



Fine Steel, Patent Temper.

Furnish your Trade with the Best Saws.

The ATKINS Saws Lead them all.

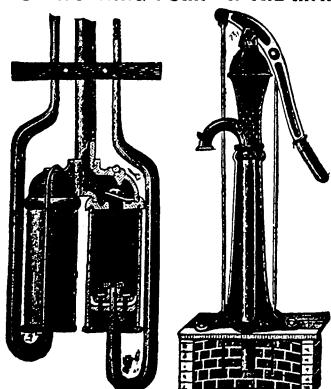
A
T
K
I
N
S

A
T
K
I
N



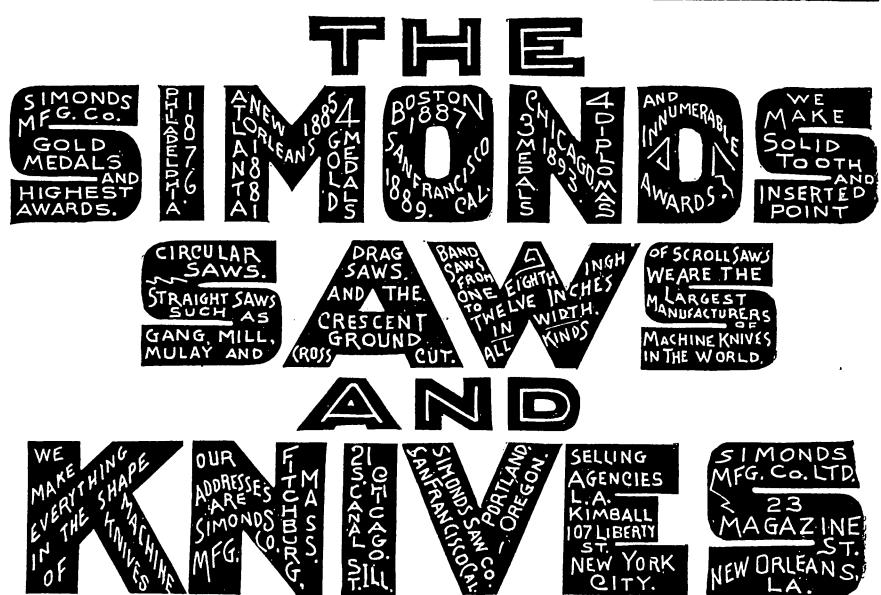
Write for Price-List and Trade Prices.

Peters Double Cylinder Force Pump.
EASIEST WORKING PUMP IN THE MARKET.



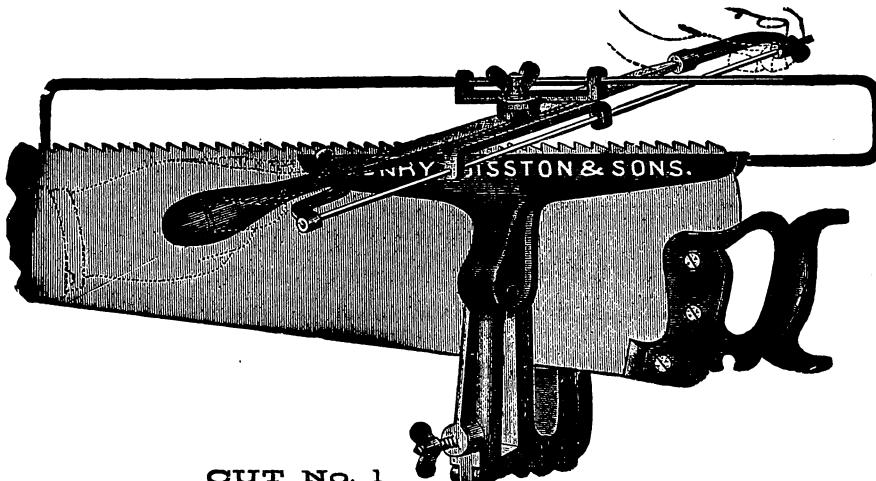
Will send any responsible dealer a sample to be returned in 30 days if not perfectly satisfactory.

WRITE FOR CIRCULARS AND PRICES.
PETERS PUMP CO., - KEWANEE, ILL.



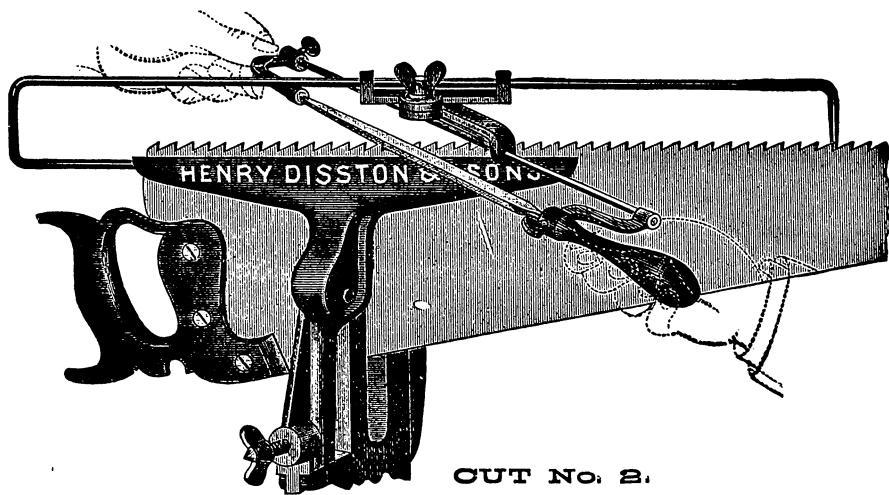
DISSTON'S Improved Saw Clamp AND FILING GUIDE.

ESPECIALLY DESIGNED TO ASSIST THOSE NOT SKILLED IN THE ART
OF SAW FILING TO FILE A SAW CORRECTLY.



CUT NO. 1

Cut No. 1 shows a saw and the attachment in proper position for filing the first side, and Cut No. 2 shows the saw and attachment reversed and in position to file the second side. There are three marks on one of the hubs of the swivel attachment, and one mark on the other. One of the three marks shows when it is in position No. 1, and the other designates when it is in position as shown in No. 2. The third, or centre, marks show when it is in position for filing Rip Saws.



CUT NO. 2.

To obtain the correct position, loosen the wing nut and move the guide around to the point desired; after tightening wing nut, loosen screw in file handle, then turn handle until file gives the shape tooth wanted.

A good way is to select a tooth of correct shape and let file down into it, tighten set screw in handle, then file a tooth to see if the shape suits. If not turn the file a little to the right or left and try another tooth until the proper shape is obtained. Then file every other tooth, see cut No. 1; when one side is filed, reverse saw and attachment and adjust as in No. 2, and file the other teeth. For Rip Saws, place the file at right angles with the saw and file every tooth. Always keep the file as nearly horizontal as possible.

This filing guide is sold only attached to our No. 3 Improved Clamp or Vise, and not sold separately. We recommend this as the best saw clamp on the market, being quickly and easily adjusted, and not liable to get out of order.

Write for price including No. 3 Clamp, Filing Guide, File and Handle complete: Packed one in a wooden box.

Henry Disston & Sons, Philadelphia, Penn.

INCORPORATED.

ARCADE FILE WORKS.



EASTERN OFFICE,
NEW YORK.

WARRANTED FILES & RASPS.

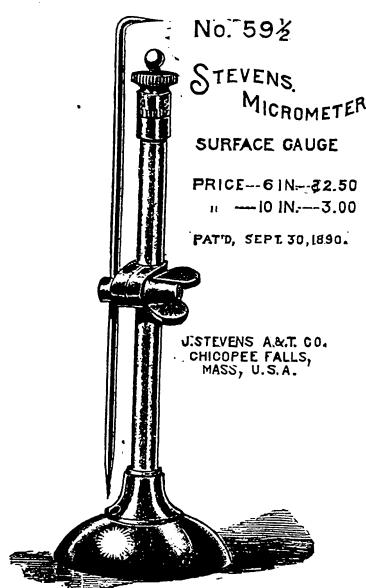
WORKS,
ANDERSON, IND.



WESTERN OFFICE.
CHICAGO.

THE FILES **THAT LEAD** THEM ALL
THE BEST EQUIPPED FILE WORKS IN THE WORLD.

FINEST MECHANICAL TOOLS.



No. 59½
STEVENS
MICROMETER
SURFACE GAUGE
PRICE—6 IN.—\$2.50
" 10 IN.—3.00
PAT'D. SEPT. 30, 1890.

SELL ONLY THE
BEST.



No. 130
STEVENS ADJUSTABLE SCRATCH GAUGE
WITH FINE ADJUSTMENT.
PRICE PLAIN ADJUSTMENT—6 IN.—\$1.75
MICROMETER 6 IN.—2.00

J. STEVENS ARMS & TOOL CO.,
CHICOOPEE FALLS, MASS. U.S.A.

J. Stevens Arms & Tool Co.,

P. O. BOX, 5729,

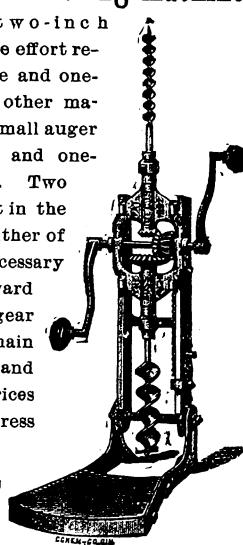
Chicopee Falls, - - - Mass



STEVENS No. 80 SCRIBER
7 INCH. PRICE, 40 CENTS

The Boss 2-speed Boring Machine.

Will operate a two-inch auger with the same effort required in using one and one-half inch in any other machine, and for the small auger have a speed two and one-half times faster. Two augers may be kept in the machine, to use either of which it is only necessary to point it downward by first taking the gear frame out of main frame, inverting and replacing it. For prices and discounts address



Buckeye Mfg. Co.,
Union City, Ind.

TAINTOR POSITIVE SAW SET

No. 93.

Retail
Price
\$1.00.



Made Entirely of Steel.

Will not slip on the teeth.
Will not cut or mar the teeth.
Has but one gauge to set.
Any set may be reproduced.

Sole Agents:
WIEBUSCH & HILGER, Ltd.
New York, U.S.A.

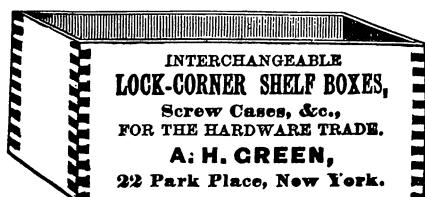
THIS IS THE "OLD RELIABLE" DOUBLE ACTION RATCHET SCREW DRIVER.

One of the very Best Tools Ever Invented.

It Combines Greater Strength, Convenience and Durability than was ever obtained in a Common Driver.

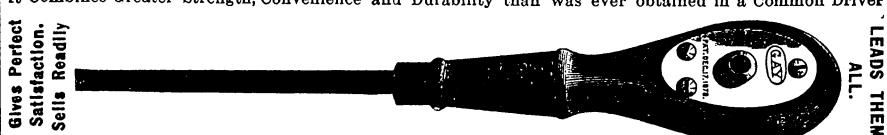
Gives Perfect
Satisfaction.
Sells Readily

Sold by all First-Class Dealers. Send for Price-List.
Manufactured by **GAY & PARSONS**, - - - Augusta, Maine, U. S. A.
JOHN H. GRAHAM & CO., Agents, 113 Chambers Street, New York.

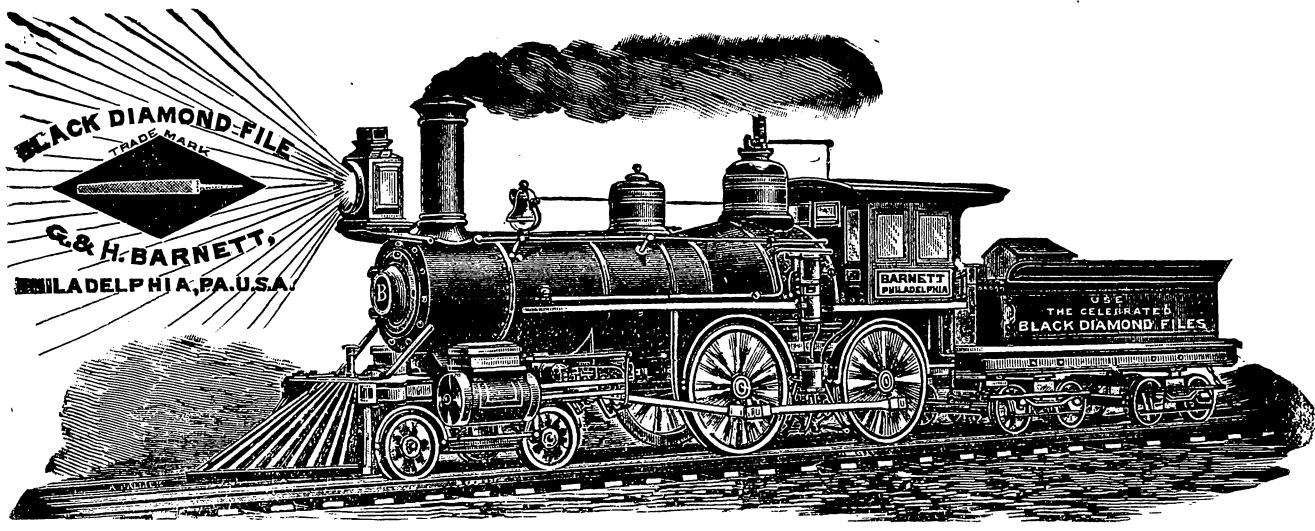


INTERCHANGEABLE
LOCK-CORNER SHELF BOXES,
Screw Cases, &c.,
FOR THE HARDWARE TRADE.

A. H. GREEN,
22 Park Place, New York.



LEADS THEM
ALL.



THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

NICHOLSON FILE CO.

PROVIDENCE, R. I.

3000
VARIETIES FILES
[X.F.] AND INCREMENT CUT FILES

J. M. KING & CO., WATERFORD, N. Y.

Manufacturers of
BUTTON'S

Pat. Wire Cutter AND PLIER COMBINED.

Specially Adapted for Use on Wire Fence.



Established by DANIEL B. KING, 1829.

Also Manufacturers of BLACKSMITHS' and MACHINISTS' STOCKS and DIES, PLUG and TAPER TAPS, HAND, NUT and SCREW TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

Philadelphia, 1876.



McCaffrey File Co.,
FIFTH and BERKS STS.,
PHILADELPHIA, PA.

For Superiority.



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

BEST
CRUCIBLE
STEEL.

"TROJAN" HORSE RASPS AND FILES.

STRONGEST
TOOTH

BANKER & WHITE,
(Troy File Works.)
N. Y. Agent, GEO. M. MATTESON, 111 Duane St.

LOWEST
IN
PRICE.

TROY, N. Y. LET

US
QUOTE.

3 NICKLE, Silver and Bronze Metallic Figures and Letters, Sizes $\frac{1}{2}$ in to 8 in. Pattern Letters, Steel Stamps, Brands, Dies &c. Send for Reduced Price List. We make a specialty of the Hardware Trade. A. A. WHITE & CO., Providence, R. I.

IT PAYS HIM.

It always pays the Hardware Dealer to have neat and attractive Wooden Shelf Boxes. With samples on the front they save the salesmen's time and attract the customer's money. Everybody knows this, but everybody has not yet sent for our Catalogue and proof. We have Wire Stitched Folding Paper Boxes for manufacturers; other Paper Boxes for every use, and Wooden Shelf Boxes as above. Write to

JESSE JONES & CO.,
615 and 617 Commerce St., Philadelphia.

TRADE MARK



John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority, against all Competitors, from

THE YEAR SEVENTEEN HUNDRED & FIFTY,

and are still in increasing demand. As in the past, it is the unalterable DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: Sycamore Street, Sheffield, England.

SOLE AGENTS FOR THE UNITED STATES,

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.

As a Labor Saver

There is no single thing in the line of hardware equal to the

AMIDON CORNER BRACE.
The Amidon Tool Corporation,
Manufacturers of
A Complete Line of Bit Braces,
1451 Niagara St., Buffalo, N. Y.
John H. Graham & Co., Sole Agts.,
113 Chambers St., N. Y.
CORNER BRACE.

AMERICAN TOOL COMPANY,
NEW YORK,
MANUFACTURERS OF
TOOL CHESTS

Of all sizes, complete with tools, for Hardware, Toy, Notion and Variety trades. Factory and Salesroom, 200 West Houston Street, near Varick. Also Machinists' Tool Chests, empty. Illustrated Catalogue and prices furnished on application.

F. S. HUTCHINSON CO.,
Paragon Self-Retaining Dumb Waiters,
HAND AND BELT POWER ELEVATORS,
Aldrich Building, 32 Warren Street,
NEW YORK.

CATALOGUES AND QUOTATIONS
Our System for Filing is the Simplest and Most Complete. Write for Descriptive Matter, Price-List and Testimonials.

The Folding Paper Box Co.,
SOUTH BEND, INDIANA.
We make all kinds of Paper Boxes, Cartons, Folding Boxes and Regular Work.

THOMAS CLARKE
HARDWARE AND GENERAL AGENT.
(FIRST-CLASS REFERENCES.)
60 PRINCE WILLIAM ST., ST. JOHN,
NEW BRUNSWICK.

EMBOSSING • • •
PAYS If you use it on your Catalog Covers. We design and print Modern Catalogs. Send for our latest.
GRIFFITH, AXTELL & CADY CO.
Printers and Embossers, HOLYOKE, MASS.

Boxes Made Absolutely Secure
BY USING THE PORTABLE
BOX BANDER
ONE MAN CAN BAND
YOUR BOXES QUICKER THAN TWO
MEN CAN IN ANY OTHER WAY.
IRON HOOP, WIRE OR ANY OTHER FLEXIBLE MATERIAL
CAN BE USED EQUALY WELL. Send for price
SOON PAYS FOR ITSELF. J.W. GOODELL • BURLINGTON, VT.

ESTABLISHED 1816.

WHITE, VAN GLAHN & CO., CHATHAM SQUARE, NEW YORK, HARDWARE JOBBERS.

Carry a full line of
Lowentraut's Skates, Special Pattern Axes,
Coal Hods, Elbows, Stove Boards, "Flexible Flyer" Sleds
and all Seasonable Goods.

WRITE FOR PRICES.

SOLE U. S. AGENTS FOR

J. B. Addis Wood Carvers' Tools.

SHARP TOOLS are a NECESSITY to a good workman, But without a GOOD WHETSTONE they are an impossibility.

That is why it is always economy to buy



PIKE'S WHETSTONES.

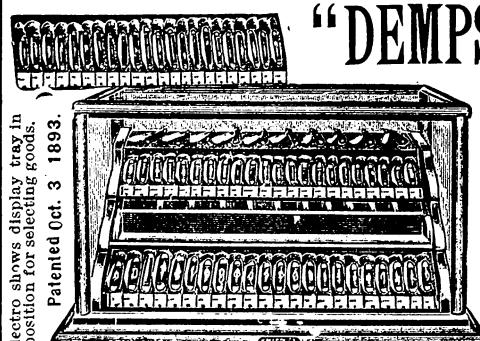
Pike's Indian Pond Scythe Stone, Strong, Sharp Grit, Quick Cutting.

Scythe Stones.

Oil and Water Stones.

GREEN MOUNTAIN, WASHITA,
LAMOILLE, ARKANSAS,
BLACK DIAMOND, HINDOSTAN,
PREM. QUINNEBAUG, WATER-OF-AYR,
WHITE MOUNTAIN, RAZOR HONES,
GENUINE RAGG, TABLE HONES,
WILLOUGHBY LAKE. AXF STONES, ETC.

THE PIKE MFG. CO., - Pike Station, N. H.



"DEMPSEY" CUTLERY DISPLAY CASE.

Convenient, Attractive, Clean. Saves Time and Money. Increases Sales.

Preserves and Protects Stock.

We will be pleased to ship through your jobber.

FOR FURTHER INFORMATION, CIRCULARS AND PRICES, ADDRESS
UNION SHOW CASE COMPANY, Chicago, Ill.

The Following Leading Firms are Authorized Agents:

Horton, Gilmore, McWilliams & Co., Chicago, Ill.
Dame, Stoddard, Kendall & Co., Boston, Mass.
F. A. Koch & Co., New York, N. Y.
A. B. Justice & Co., Philadelphia, Pa.
Henry Keldell & Co., Baltimore, Md.
The Wm. Bingham Co., Cleveland, Ohio.
Speer Hardware Co., Fort Smith, Ark.
Dixon, Bergeson & Co., Portland, Oregon.
Henry Sears & Co., Chicago, Ill.
John Pritzlaff Hdw. Co., Milwaukee, Wis.
Farwell, Ozman, Kirk & Co., St. Paul, Minn.
Fletcher Hardware Co., Detroit, Mich.
Baker & Hamilton Hardware Co., San Francisco, Cal.

Kirkpatrick Hardware Co., Atlanta, Ga.
W. C. Belknap & Co., Louisville, Ky.
A. F. Sharpley Hdw. Co., St. Louis, Mo.
The Wright Hardware & Mfg. Co., St. Joseph, Mo.
Rogers & Baldwin Hdw. Co., Springfield, Mo.
McGregor-Neel Hdw. Co., Springfield, Mo.
Wells & Nelson Co., Chicago, Ill.
Wadsworth & Matheson, Jacksonville, Ill.
Van Camp Hardware & Iron Co., Indianapolis, Ind.
The Way Hardware Co., Hartford, Conn.
Alfred Ely & Co., Baltimore, Md.
E. F. W. Meier, St. Louis, Mo.

"Stamped with the BUCK'S HEAD."



BUCK BROTHERS, MILLBURY, MASS.

The Most Complete Assortment in the U. S. of
Shank, Socket Firmer and Socket Framing
Chisels, Fine Bevel Edge Chisels, Plane Irons.

TWO PRIZE MEDALS,

No. 1098 and No. 1099, AT WORLD'S FAIR.

Buyers are cautioned against any parties who claim a recent connection (or any connection for over 20 years) with Buck Bros., or who represent goods as our make not stamped with the BUCK'S HEAD or BUCK BROTHERS in full.

ESTABLISHED, 1825.

R. HEINISCH'S SONS CO., NEWARK, N. J.

New York Office, No. 90 Chambers Street.

INCORPORATED, 1892.



Tailors' Shears, Trimmers, Scissors,
Tinners' Snips, &c.

CATALOGUES AND PRICES ON APPLICATION.

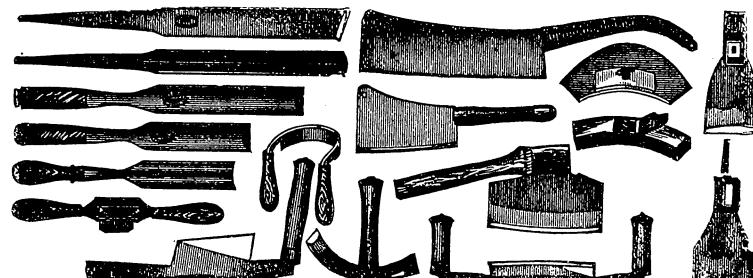
We have no contract with Messrs. Hermann Boker & Co. as Agents for the sale of our goods.

HIGHEST AWARD PARIS EXPOSITION, 1889.

ESTABLISHED 1837
INCORPORATED 1892.

THE L. & I. J. WHITE CO., MANUFACTURERS OF **EDGE TOOLS.**
BUFFALO, N. Y.

Coopers', Carpenters' and Ship Tools, Plane Irons,
Cleavers, &c. Full Line Chisels.



1858

Highest Awards at the World's Exposition for Superior Tools.



CHARLES BUCK,

sole surviving member of the original firm of BUCK BROS., and proprietor of the
MILLBURY EDGE TOOL WORKS, MILLBURY, MASS.

Manufacturer of the

GENUINE STANDARD BUCK TOOLS

All kinds of Shank, Socket Firmer Chisels and Gouges, Cut and Double Irons, S. D. Bits, etc. Send for Catalogue. CAUTION.—Buyers wanting the standard Buck Tools will see that they get only those stamped CHARLES BUCK when ordering from the jobbing houses. Address all correspondence to CHARLES BUCK or the

Millbury Edge Tool Works, Millbury, Mass.

FINEST CAST STEEL

RAZORS

Trade-Mark "Charles Buck."

GUARANTEED HAND FORGED AND HAND GROUNDED.

Any Style or Brand made to order. Facilities "up to date." Razor Handles, all sizes and styles in stock.

MILLBURY RAZOR CO., Millbury, Mass.

JOSEPH BOOTH, Treas.

PRICES ON APPLICATION.

THOS. SHALES, Secy.

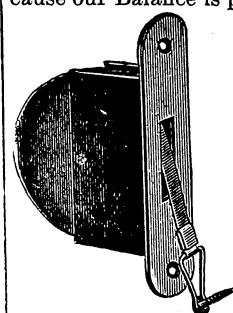
Cast Shears.

ACME SHEAR CO.,

BRIDGEPORT. - CONN.

A RECORD BREAKER.

It seems strange when we say that our business is good and the demand for our **STEEL FRAME SASH BALANCE** grows every day. We know why: because our Balance is perfect in construction and gives general satisfaction. Ask us for prices and don't confuse ours with the cheaper grades of Cast Iron makes.



ASK FOR THE
"Pullman."

PULLMAN SASH BALANCE CO., Rochester, N. Y.

New York Office, 142 Chambers St.
Chicago Office, 235 Lake St.

IF YOU WANT THE BEST
BOARDMAN SPOONS
THEIR MAKE IS EQUAL
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
NICKEL SILVER SPOONS
THEIR MAKE IS EQUAL
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
SILVER PLATED SPOONS
THEIR MAKE IS EQUAL
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

Peripatetic "Pull"

Peddlers

Sell numbers of Nail Pullers in places where Hardware Dealers either fail to display such goods or, worse yet, do not keep them at all. Why not hold your trade with the **Black Hawk**? Nine dollars a dozen, net.

American Specialty Company,
Hartford, Conn.

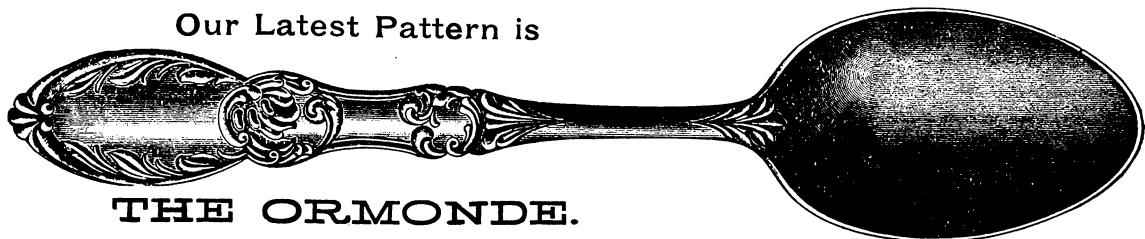


The Leader is the



SILVER PLATED WARE.

Our Latest Pattern is



WM. ROGERS MFG. CO.,

Salesroom and Office, Hartford, Conn.

FACTORIES: HARTFORD, CONN., NORWICH, CONN., AND TAUNTON, MASS.

Quality or Price? —

Don't sacrifice quality for price. Don't pay too much for quality. You do neither by buying of us. The name of a reliable manufacturer on goods is worth more than it costs.

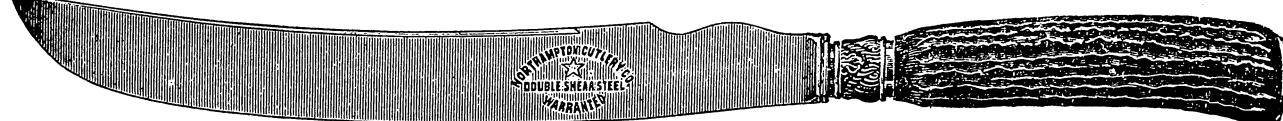
Send for
folders.



THE HOLMES & EDWARDS SILVER CO., - - - Bridgeport, Conn.

NORTHAMPTON CUTLERY CO.,

NORTHAMPTON, MASS., and 122 CHAMBERS ST., NEW YORK.



WE CALL ESPECIAL ATTENTION TO OUR COMPLETE LINE OF FINE GOODS IN RUBBER, CELLULOID, BONE, IVORY, &c.

— OUR CLAIMS ARE: —

EXTRA QUALITY OF STEEL IN BLADES. SUPERIORITY IN GRINDING AND FINISH. STRENGTH AND DURABILITY
Made In Plain Steel or Heavily Plated Blades, Hand Burnished.

CIMETAR BLADE STEAK KNIFE.



BUTCHERS ALL WANT THEM.

We have yet to know the dealer who ordered a sample of this Knife that did not reorder and carry them in stock. It needs only to be shown to a Marketman to find a ready sale; it is forged from our best English Double Shear Steel and every blade fully warranted. The list price is subject to our usual discount.

NICHOLS BROTHERS, - Greenfield, Mass.



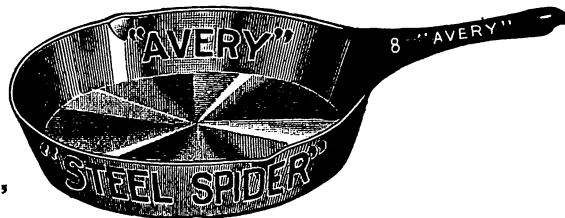
This is a fac-simile of the label on my VULCAN TOOL CO. brand of HATCHETS; a brand for which I have a regular trade in some sections, but to those who have not "caught on"—dealers who are handling an outside brand—I offer a limited quantity at a very low price. Inquiries for price solicited.

FAYETTE R. PLUMB, Philadelphia.

STEEL

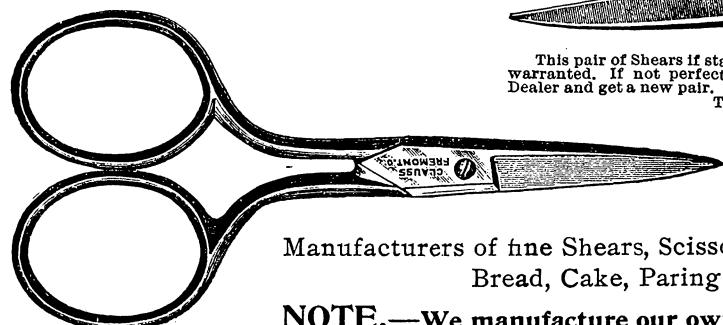
Spiders,
Griddles,
Kettles,
Maslins,
Scotch Bowls,
Stew Pots,
Stew Pans,
Etc.,

Will Not Warp.

**ATTENTION.**

Quick Shipments.
Complete Line.
Perfect Goods.
No Delays.

The Avery Stamping Co.,
Cleveland, O.

Clauss

This pair of Shears if stamped "Clauss, Fremont, O." is fully warranted. If not perfectly satisfactory return them to your Dealer and get a new pair.

THE CLAUSS SHEAR CO., Fremont, O.

THE CLAUSS SHEAR CO.,
Fremont, O., U. S. A.,

New York Office, 100 Chambers Street,

Manufacturers of fine Shears, Scissors, Tinnery Snips and The Celebrated Clauss Bread, Cake, Paring and the Perfect Carving Knives.

NOTE.—We manufacture our own Scissors.

Fremont, O.**Swedish Razor Co.** (EXCELSIOR CUTLERY CO.)

WORCESTER, MASS.,

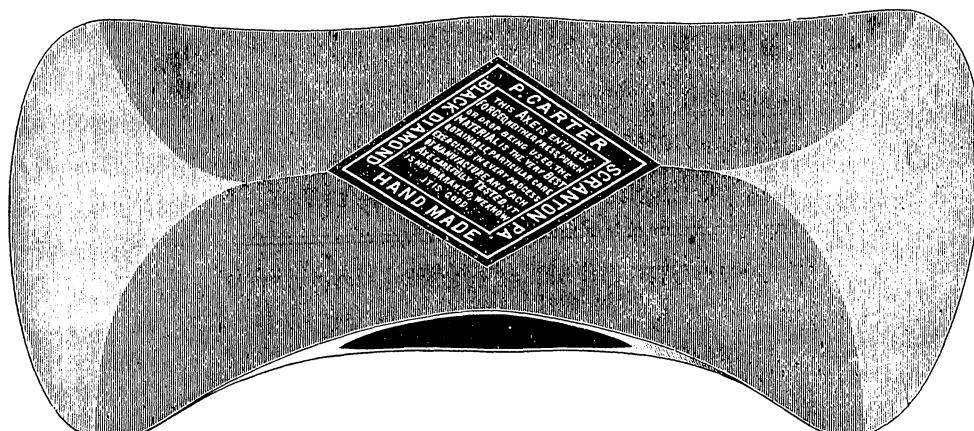
Are making the best

RAZORS in the world.

EVERY ONE HAND FORGED, TESTED AND WARRANTED.

This is the only factory in the United States making } Razors by hand from beginning to end. } **Send for Catalogue**

PEOLI & WILLEY, 97 Chambers St., New York Agents.



MICHIGAN PATTERN.

Black Diamond Finish.

Established 1841.

Carter & Co.,

SCRANTON, PA.,

MANUFACTURERS OF

All kinds of Chopping Axes, Bark Spuds, Axe Eye Splitting Mauls, Anthracite Mining Tools.

Send for Catalogue.

THE AMERICAN AXE AND TOOL CO.,

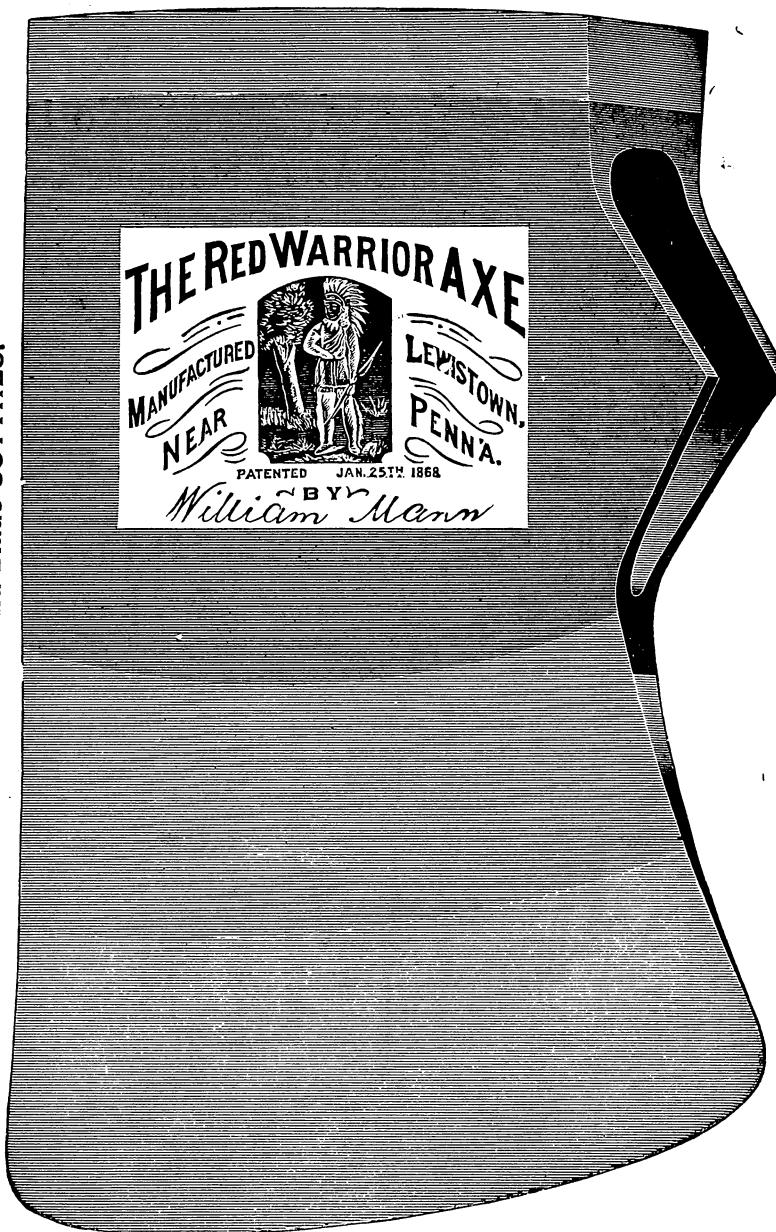
NEW YORK.

TELEPHONE, 1023 CORTLANDT.

Manufacturers of

BLOOD, HUNT, LIPPINCOTT, RED WARRIOR, MANN, HURD, PEERLESS, JAMESTOWN,
ROMER, FRANCIS, SHARPS, UNDERHILL, STEWART,
Brands of

AXES, HATCHETS, BROAD AXES and ADZES, also "Blood's" Champion and
"Hubbard's" Diamond Blade SCYTHES.



253 Broadway,

ALWAYS IN STOCK.

ADDRESS ALL CORRESPONDENCE TO NEW YORK OFFICE.

Grass Hooks, Corn Knives, Bush Hooks, Planters' Eye Hoes, Ice Axes, Ice Hatchets and
Firemen's Axes, Wood Chisels, Picks, Mattocks, Brick Hammers, Box Openers, Ice Chisels, Butchers'
Handled Axes, Meat Hatchets.

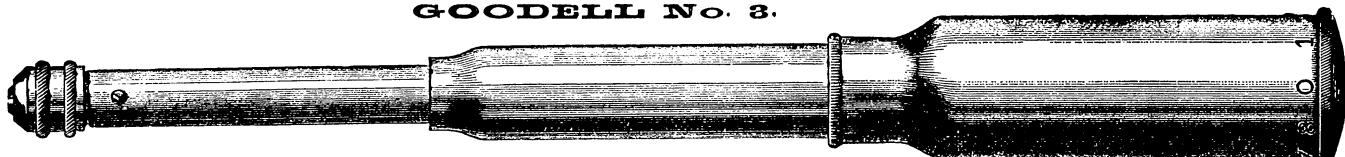
ALWAYS IN STOCK: Best Leading Brands of Axes and Edge Tools. Cheap Handled
Axes. Medium Grade Axes. Boys' and Hunters' Axes. **Job Lots of Axes, all Grades
and Patterns.**

DRILL POINTS
Always in the Handle.

THE BEST AUTOMATIC DRILL IN THE WORLD.

SEND
FOR CIRCULAR.

GOODELL NO. 3.



1

3

5

7

2

4

6

8

H. H. MAYHEW CO.,

SHELBYNE FALLS, MASS., U. S. A.

Manufacturers of Fine Mechanics' Tools.

Drills for Wood
& Metal, Counters-
inks, Screw
Drivers, Chucks,
&c., for sale by
the trade.

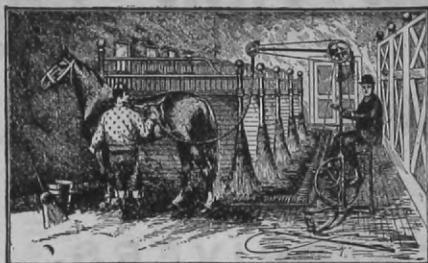
Syracuse Twist Drill Company,
SYRACUSE, N. Y.



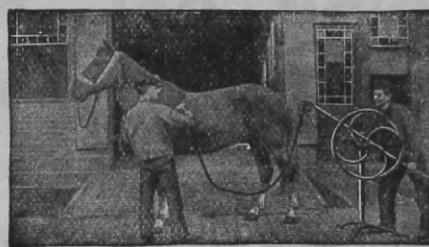
Every tool fully
Guaranteed.
Beware of im-
itations.



First Prize, Highest Medal of Award, World's Fair, Chicago, Ill., 1893.



THE CYCLONE CLIPPER.



GILLETTE'S CELEBRATED HAND POWER MACHINE.



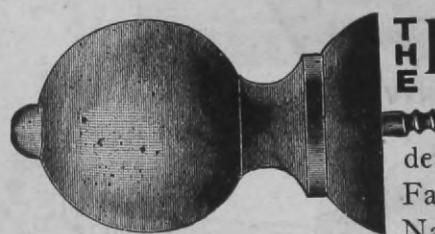
'YOKE' CLIPPING MACHINE, OPERATED BY ANY KIND OF POWER.

HEADQUARTERS FOR HORSE CLIPPING MACHINES.

Greatest Variety of Power Horse Clipping Machines in the World.

Over 2,700 in use—over 200 in New York City in constant operation. Introduced in the leading Horse Car Stables, Express Companies, Breweries, Dry Goods Houses, &c., in the United States and foreign countries. Send for Catalogue illustrating our machines, prices, &c., just out.

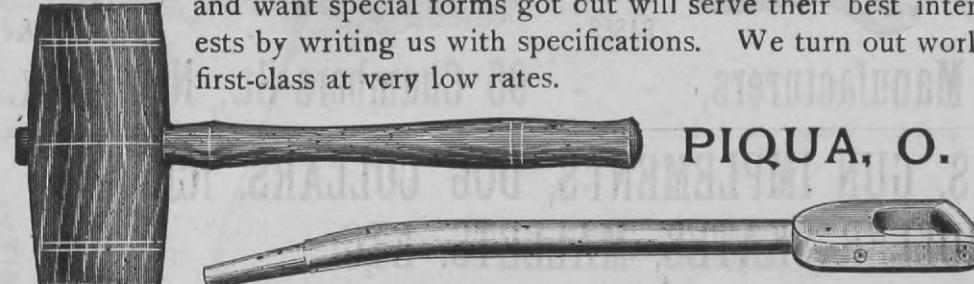
GILLETTE CLIPPING MACHINE CO., 201 East 23d Street, New York.



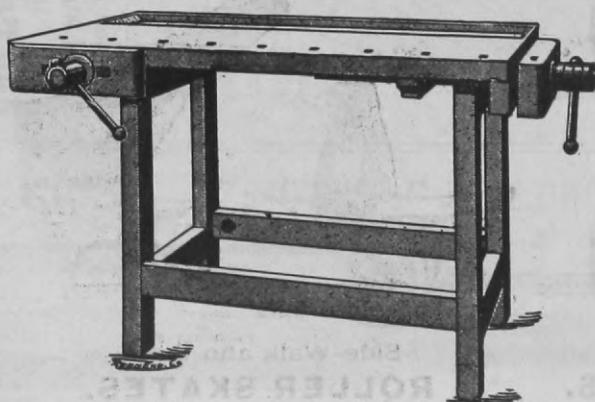
Piqua Handle & Mfg. Co.,

Manufacturers and Dealers who desire to use or sell anything in the line of Farming Tool Handles, Garden Rakes, Natural Wood Lock Furniture, Base Knobs,

Electric Push Buttons or anything in the Handle line and want special forms got out will serve their best interests by writing us with specifications. We turn out work first-class at very low rates.



PIQUA, O.



Youths' Cabinet Bench FOR HOLIDAY TRADE.

A popular idea for parents is to cultivate the mechanical ambition of their boys. This Bench is similar to a regular Cabinet Makers' Bench, but smaller. Length over all, 4½ ft., width 20 inches, with 13-inch glued up top and fitted with head and tail vises.

Dealers sold a great many last year for the holiday trade.

WRITE FOR PRICES.

G. R. HAND SCREW CO., GRAND RAPIDS, MICH.

JOHN S. FRAY & CO.,

BRIDGEPORT, CONN., U. S. A.



Spofford Bit Brace.

The Spofford Bit Brace is made under Letters Patent of the U. S. A., granted to N. Spofford, March 28, 1880, assigned to John S. Fray & Co.	
All Iron, Five Sizes.	Cocobolo Head and Handle, Nickel Plated.
No. 7.....7 inch sweep.	No. 107.....7 inch sweep.
No. 8.....8 "	No. 108.....8 "
No. 10.....10 "	No. 119.....10 "
No. 12.....12 "	No. 112.....12 "
No. 14.....14 "	No. 114.....14 "

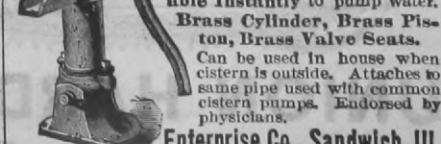


Spofford Sleeve Brace.

AERATING PUMP

Purifies and Sweetens foul and offensive cistern water and makes it healthful to use.

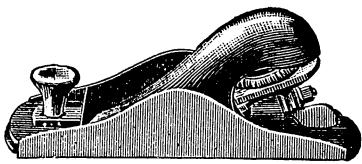
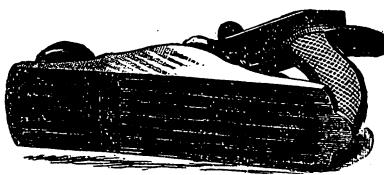
Restores the Fresh Oxygen to stagnant water and gives it life and pleasant taste. Forces air into the water at bottom of well or cistern, which air in passing upward agitates and aerates the water thoroughly, removes bad odor and leaves it pure. Remarkable results. Changeable Instantly to pump water.



Enterprise Co., Sandwich, Ill.

CARPENTERS' AND MACHINISTS' TOOLS.

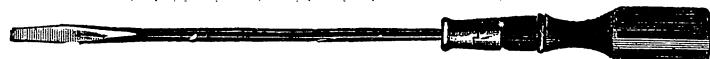
Chaplin's Pat.
Iron Planes,
Corrugated
Bottoms,
Checkered
Rubber Handles.



Chaplin's Block
Planes, Solid
and Adjustable
Throats.
Nickel and
Japan Finish.

TOWER'S CHAMPION SCREW DRIVERS.

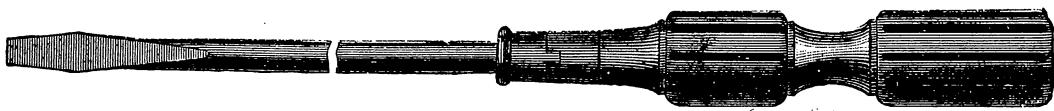
The Fluted
Handle Gives
the Best
Possible Grip.



CHAMPION CABINET SCREW DRIVER.

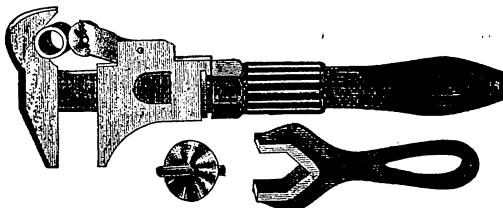


CHAMPION SCREW DRIVER.

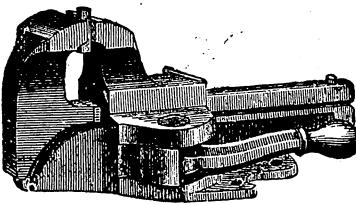


CHAMPION MACHINISTS' SCREW DRIVERS.

ENGINEERS'
WRENCHES,
SHORT AND
LONG NUTS
AND WITH
PIPE
CUTTERS.



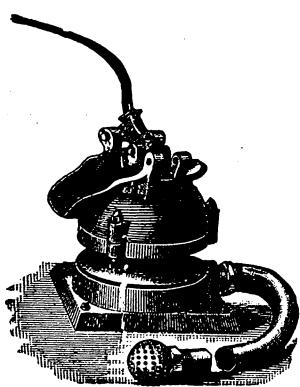
STEPHEN
VISES,
STATIONERY
AND
SWIVEL
BASES.



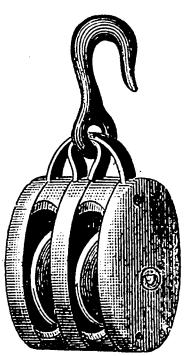
ALSO PLUMB
BOBS,
TRAMMEL
POINTS,
LEVELS
OILERS
WRENCHES, &c

TOWER & LYON, Manufacturers, - - 95 Chambers St., New York.

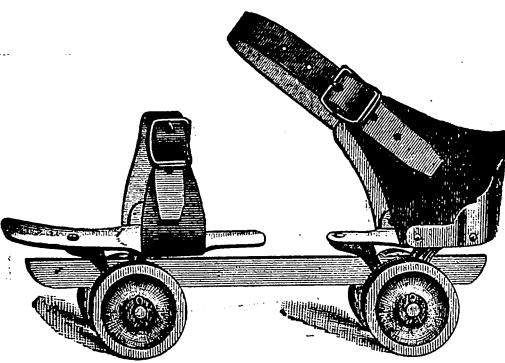
TACKLE BLOCKS, GUN IMPLEMENTS, DOG COLLARS, ICE AND ROLLER SKATES, MALLETS, ETC.



Loud's Patent



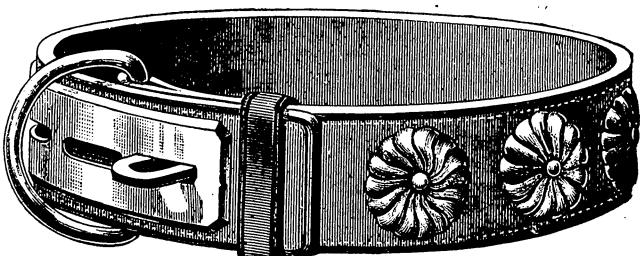
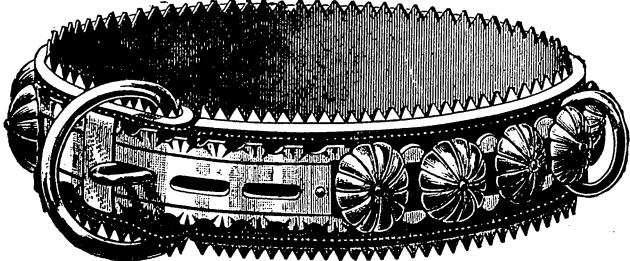
Union Brand



Side-Walk and Rink
ROLLER SKATES.

SUCTION PUMPS. TACKLE BLOCKS.

A Full Line of Dog Collars, Muzzles, Leads, Etc.



UNION HARDWARE CO., - TORRINGTON, CONN.

New York Office, TOWER & LYON, 95 Chambers St., New York.

WINSLOW'S ICE SKATES.

ALL STYLES CARRIED IN STOCK. PROMPT SHIPMENTS
AT LOWEST PRICES.

—SEND FOR CATALOGUE.—

DAME, STODDARD & KENDALL,
SELLING AGENTS.

374 Washington Street, - BOSTON, MASS.

LONG REACH ICE SKATES.

MANUFACTURED BY
KEENE MFG. CO., KEENE, N. H.



BIGELOW & DOWSE CO., General Agents,
229 FRANKLIN STREET, - BOSTON, MASS.
SEND FOR 1894 CATALOGUE.

Complete Line of Ice Skates,
From the Cheapest to the Finest.

—AGENTS.—

Supplee Hardware Co., Philadelphia, Pa.
McIntosh - Huntington Co., Cleveland,
Ohio.
A. F. Shapleigh Hdw. Co., St. Louis, Mo.
Smith, Lyon & Field, New York, N. Y.
The Henry Sears Co., Chicago, Ill.
Farwell, Ozmun, Kirk & Co., St. Paul,
Minn.
Standart Bros., Detroit, Mich.
Jay A. Rickard, Schenectady, N. Y.
Weed & Co., Buffalo, N. Y.

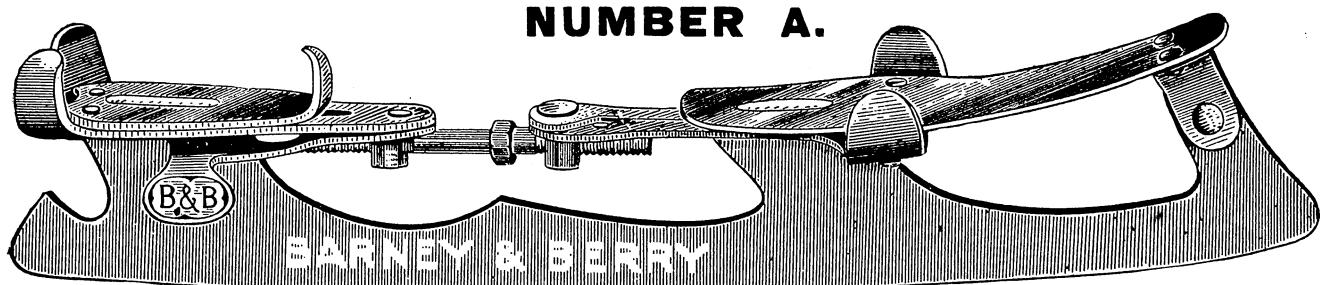
HIGHEST AWARD.—WORLD'S COLUMBIAN EXPOSITION.

In EVERY LAND where water freezes the BARNEY & BERRY SKATES are known.

FOR SALE BY ALL
LEADING JOBBERS

Why not get the BEST? OF HARDWARE AND SPORTING GOODS.

**BARNEY & BERRY'S
NUMBER A.**



Above cut shows the best cheap skate ever offered in the world.

Dealers should examine in comparison before buying another make of inferior quality and workmanship.

THE HIGHER GRADES OF OUR MANUFACTURE ARE TOO WELL KNOWN TO NEED MENTION HERE.

FACTORY AT SPRINGFIELD, MASS.

New York Office, 114 Chambers St.

Philadelphia Office, 23 N. Fourth St.

New England Office, 115 Broad St., Boston, Mass.

Catalogue Free, showing 50 styles and grades of finish.



Established 1856.

Incorporated 1886.

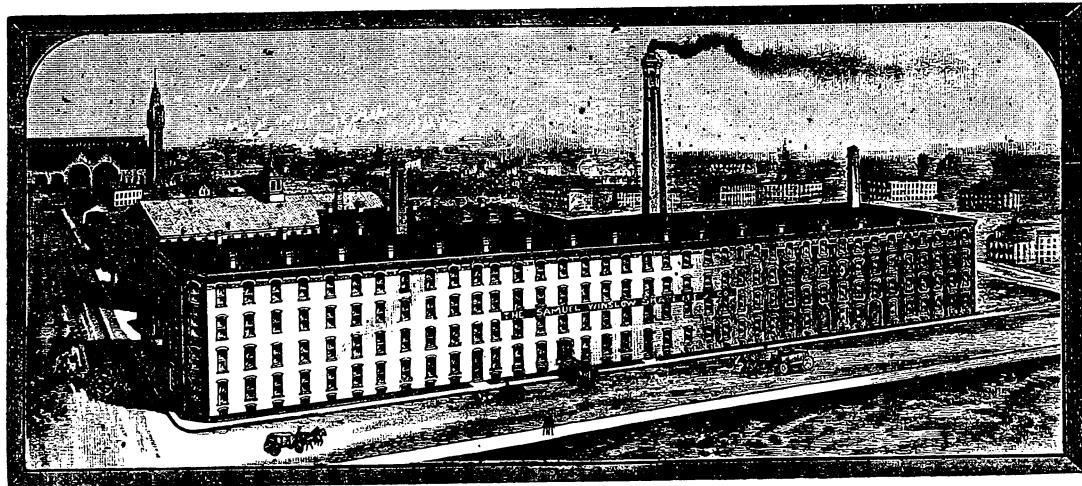


We sell more Skates than any other makers.

We make better Skates than any other makers.

Our line of Skates is more complete than any other made.

We never work off Job Lots on our customers.



Our line of Skates is without an equal.

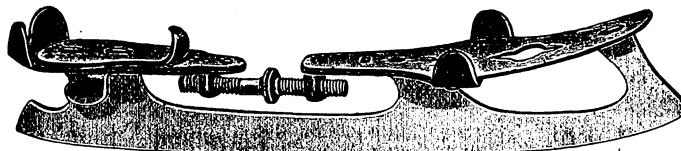
Their reputation as the best extends to all lands.

Prompt Shipments from Stock to Our
Customers Guaranteed.



SICKELS, SWEET & LYON,

WHOLESALE HARDWARE,



Office 35 Barclay Street,
Warehouse, 40 Park Place,

NEW YORK.

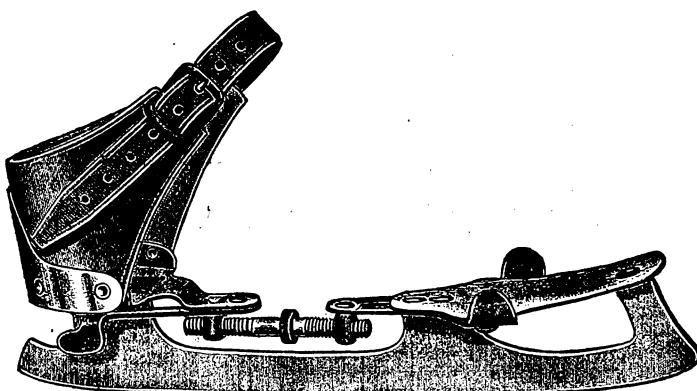
NEW YORK

SELLING AGENTS

FOR

Winslow's

Skates.

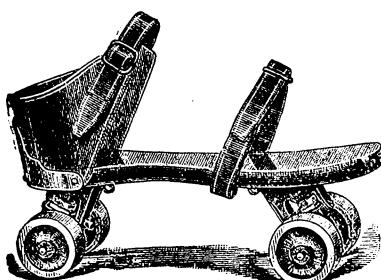


Agents for Union Steel Screw Co.

“ “ Eagle File Co.

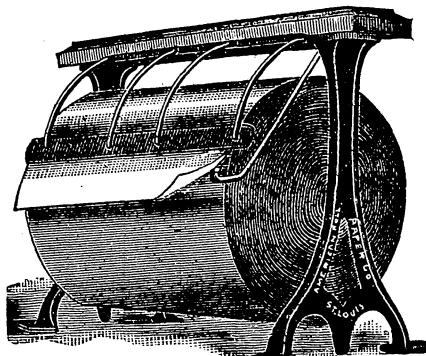
HENLEY'S - CELEBRATED Rink AND Club

Roller Skates.



A full, new and complete stock of Roller Skates, Skate Repairs and Rink Supplies. Address for 80 page Catalogue and Prices,

M. C. HENLEY,
RICHMOND, IND.



THE ECONOMIC HOPKING ROLL PAPER CUTTER.

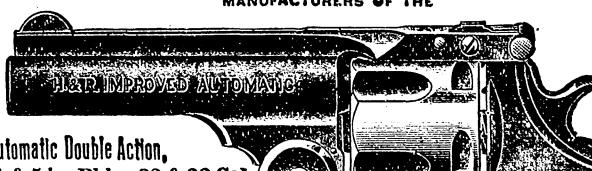
Made in all sizes, 6 to 36 inches, at \$1.50 each.
Japan and Hardwood Finish.

Made by the

American Roll Paper Co.,
St. Louis, Mo.

Harrington & Richardson Arms Company,

MANUFACTURERS OF THE



Improved Automatic Double Action,
3 1-4, 4 & 5 in. Bbls., 32 & 38 Cal.

IMPROVED EJECTING DOUBLE ACTION,
3 1-4 in. Bbls., 32 & 38 Cal.

"Premier" Automatic Double Action Revolvers,
3 1-4, 4 & 5 in. Bbls., 32 & 38 Cal.

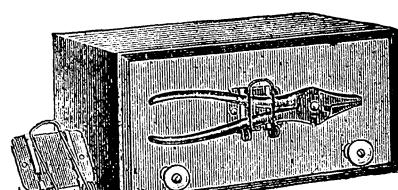
This line is unsurpassed for Style, Finish
and Convenience in Manipulation.

The Safety Hammer Double Action.—Patented April 5th, 1887.—made in 3
Calibers, 32, 38 and 44. The American Double Action Revolver in
32, 38 and 44 Caliber, with 2½, 4½ and 6 inch barrels.

The Young America Double Action Line, 22 and 32 Caliber, and
The Vest Pocket Self-Cocker, 32 Caliber, Altogether making the most desirable
line of Double Action Fire-arms manufactured by any Company in the world.

MADE BY DEALERS IN HARDWARE AND FIRE-ARMS.

WORCESTER, MASS., U. S. A.



PAT. APPLIED FOR.

SHOW

Your goods by sample. Save time and avoid
loss from shopworn samples by using Thomp-
son's Sample Holder.

—Manufactured by—

MASSEY & THOMPSON, Monroe City, Mo.

Write for prices or send 5c. for a sample.



To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

IDEAL MFG. CO., New Haven, Ct., U. S. A.

Please mention *The Iron Age* when you write.



Clipper Bicycles

are built to please the dealer and rider.

Are you in the bicycle business? If not, you can make it pay to handle Clippers. Buy direct from the manufacturer and save the jobbers' profit. It will add considerable to your bank account. We want responsible dealers only. We may be able to interest you, in fact we are sure of it. Our policy is a protective one, and will please you. It protects against Scalpers and "Curb Stone Brokers."

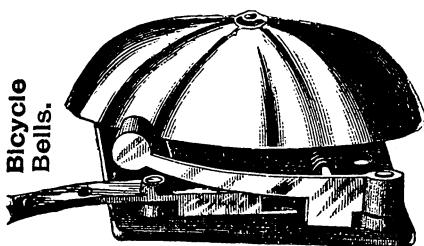
Grand Rapids Cycle Co.,
GRAND RAPIDS, MICH.

SKATE GRINDING MACHINERY.

A complete line. Write for prices of the

Keenedge Skate Grinder
and Skate Holder.

Charles Perkins, - Bridgewater, Mass.
Special discount to the Hardware Trade.



BEVIN BROS. MFG. CO., Easthampton, Conn.,
Manufacturers of

Sleigh Bells, House Tea Hand, Gong Bells, &c.

A QUESTION?

Why do all Sportsmen prefer

EUREKA GUN IMPLEMENTS?

THE ANSWER

Is because the No. 0 Closer gives a square crimp; the No. 95 Cleaning Rod is made just the right weight and length for all guns; the Powder Measure No. 20 R is standard for all grades of powder and the complete line is

UP TO DATE.

Just added, a complete set of Cleaning Tools to our Eureka Line, No. 144, containing No. 95 Cleaning Rod, Flannel Wiper, Steel Wire Scratch Brush, Bristle Brush, Bottle of Oil, Tube of Paravaseline, Oil Can and Screw Driver. \$1.25 per set.

Ask Your Dealer to Show You This Set.

Send 4c. in stamps for illustrated catalogue.

BRIDGEPORT GUN IMPLEMENT CO.,
313 and 315 Broadway, New York.

WE ARE AGENTS FOR:

Wm. Jessop & Sons' Cast Steel.

Washbourn & Moen Mfg. Co.'s Wire Rope.

Boston Belting Co.'s Rubber Goods.

Alexander Bros.' Oak Tanned Belting.

Jarecki Mfg. Co.'s Steam Fittings, &c.

Peet Valve Co.'s Valves.

Ericsson Hot Air Pumping Engines.

The Samuel Winslow Skate Mfg. Co.'s Ice Skates.

Chicago Emery Wheels.

Black Diamond Files.

Russell & Erwin's Screws.

P. & F. Corbins Builders' Hardware.

Landers, Frary & Clark's Table Cutlery.

Geneva Tool Co.'s Agricultural Tools.

Write us for Prices.

THE W. BINGHAM CO., 146, 148 & 150 Water St.,
97 & 99 Superior St., Cleveland, Ohio.

THE CRAWFORD MFG. CO.

MAKERS OF
HIGH GRADE AND JUVENILE

BICYCLES,
FACTORY, HAGERSTOWN, MD.

NEW YORK OFFICE, 72 READE STREET. L. B. Whymper, Mgr.

DIRECTIONS FOR USING

WILLIAMSON'S NEW POWER CORK SCREWS.

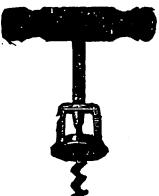
KEEP ON TURNING, DO NOT PULL.

No. 1248, Nickel Plated, Apple Wood Handle, \$5.00 per dozen.
1449, " " Rosewood " 5.50 " "

For Discounts and Prices of other styles send for Catalogue.

C. T. WILLIAMSON WIRE NOVELTY CO., NEWARK, N. J.

Manufacturers of Wire Specialties for the Trade



THE NEW "PROTECTOR" REVOLVER
A 7-SHOT, 32 CALIBRE, STANDARD CARTRIDGES.

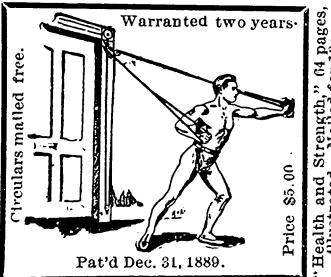


QUICK! DURABLE!
COMPACT! EFFECTIVE!

The most Genteel and Serviceable Rapid Firing Revolver ever manufactured. Carried in the vest pocket as easily as a watch. Absolutely Safe! Automatic Safety Lock! An Ideal Weapon for a man to carry. Selling by the Thousand. Elegantly Finished, Neatly Packed in a Box, Price \$6.00. Ask your Dealer for them or send to us.

CHICAGO FIRE ARMS CO., 637-638 Monadnock Building, CHICAGO, ILL.

THE WHITELY EXERCISER



A Complete Home Gymnasium

MADE OF ELASTIC CORD RUNNING OVER

NOISELESS CONE BEARING PULLEYS

RESISTANCE SELF ADJUSTING.

RECOMMENDED BY ALL PHYSICIANS.

DEMAND CREATED BY THE MANUFACTURERS.

Liberal Discount to Dealers.

MANUFACTURED ONLY BY

39th St. and

Stewart Ave.,

CHICAGO. U. S. A.

THE INDEPENDENT ELECTRIC CO.

Write for Prices
to the

12 Styles for
Ladies' and Gents' "Wire
Garments.



Hangers."

Barber-Koenig Mfg. Co., No. 119 North Vine St., Hazleton, Pa.

TUCK MFG. CO., Brockton, Mass. Established 1852.
Tools and Springs.



FINE SCREW DRIVERS OF ALL KINDS.

SEND FOR CATALOGUE.

MONARCH BICYCLES

ARE ABSOLUTELY THE BEST THAT MONEY CAN BUILD
AND ARE HANDLED BY HARDWARE DEALERS TO BETTER
ADVANTAGE THAN ANY OTHER BICYCLE ON THE
AMERICAN MARKET.

Material—the Finest.
Workmanship—Unsurpassed.



Many Special Features for 1895.

Write for Terms and Territory.

Monarch Cycle Co.,

No. 97 and 99 Reade St., New York. Lake and Halsted Sts., Chicago, Ill.
C. F. GUYON COMPANY (LIMITED), Managers. (Retail Salesroom, No. 280 Wabash Ave., Chicago, Ill.)

" Hair Curled in less than 5 Minutes."

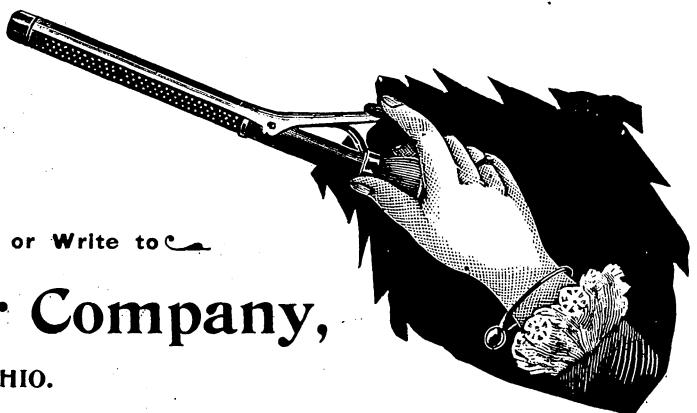
Trixxy Hair Curler.

Self Heating, no delay. No Gas or Flame required. Always Clean and Ready. May be used anywhere. A Perfect Curler, cheap. Neat and an attractive seller. Just the thing for Holiday Trade.

Ask Your Jobber for them or Write to

Trixxy Hair Curler Company,

CINCINNATI, OHIO.



ELEMENTS OF COST.

By Frederick W. Child.

20 PAGES, 5 x 7 $\frac{1}{4}$ Inches
Paper, 25 cents.

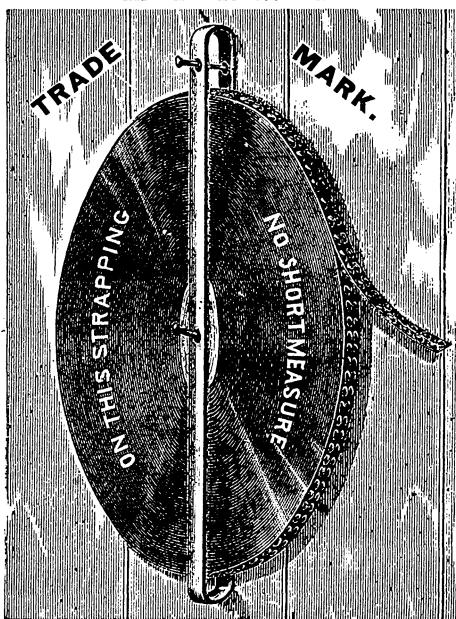
An address to the Institute of Accounts, New York, of which the writer is a member, put in form to assist those in charge of manufacturing accounts. Practical forms are included for a series of order books, examples of foreman's order, form of pay-roll, quarter-time book, job time book, form of summary, charges book, summary of costs, material, labor, cash, expense, manufacturing and improvement acts, store-room, iron foundry, brass foundry.

sent, Postpaid, on receipt of price, by

DAVID WILLIAMS, Bookseller & Publisher,
96-102 Beale Street, New York.

A - SUBSTITUTE

PATENTED IN ALL COUNTRIES.



for strap iron for binding packing cases Made in four widths, half inch to one inch wide. Saves time and waste.

Mention *Iron Age*.

CARY MFG. CO.,

5-9 Elm St.,

New York, N. Y.

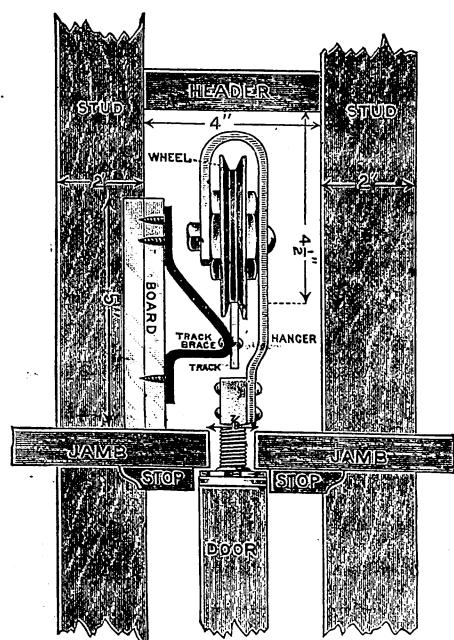
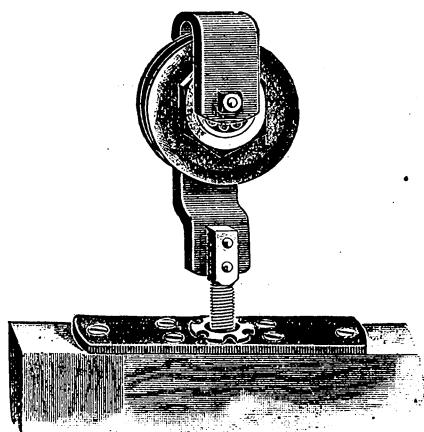
MONCE'S NOVELTY GLASS CUTTERS. — INTERCHANGEABLE LOCK STENCILS.



No. 1 Cutter. All glass men are familiar with this tool.

S. G. MONCE, BRISTOL, CONN.

Lane's New Model Patent Steel Parlor Door Hanger.



IS MADE ENTIRELY OF STEEL, AND ALL
PARTS TINNED.

Sole Agents,

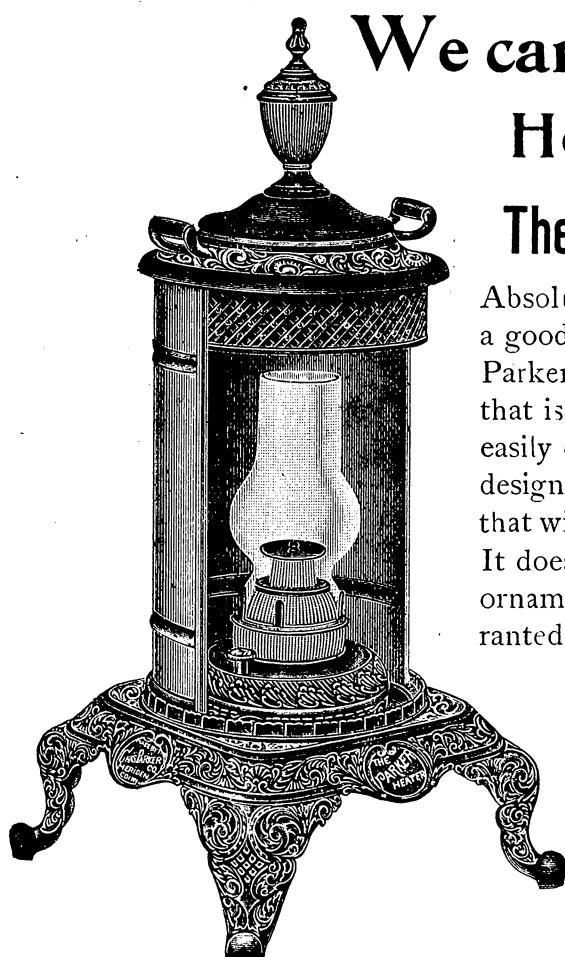
JOHN H. GRAHAM & CO., 113 Chambers Street, New York.

P. O. Box 1042.

We can make it Hot for you!

The Parker Heater.

Absolutely safe. If you want a good Heater to sell, buy the Parker. If you want a Heater that is simple in construction, easily operated and of artistic design, if you want a Heater that will *heat, buy the Parker.* It does the business and is an ornament to any room. Waranted in every respect.



The Charles Parker Co.

Meriden, Conn.

New York Salesroom:

97 Chambers St.

“It Will Take the Chill
Off a Cold Room.”

THE ROCHESTER PARLOR HEATER.

Mr. Russell Sage, the well known New York banker, has bought a good many lamps of us, and Mr. Sage is not given to buying or recommending articles without merit. This is what he says of The Rochester Parlor Heater:

NEW YORK, Sept. 24, 1804.
The Rochester Lamp Co.,
42 Park Place, New York.

Gentlemen—I take pleasure in saying a few words of praise of your little “Rochester Parlor Heater.” I have two of them—one in my house in the city, and the other in my country home at Cedarhurst, L. I. I consider it the prettiest, cleanest and most useful heater for taking the chill off a cold room I have ever seen, and for general convenience in the house it is unapproachable. My experience with use of the “Heater” has caused me to recommend it to others, and I am happy to say that I have been thanked over and over again for recommending it, as it was “just what was wanted.” I commend it as a useful, ornamental and economical “Heater” that will be sure to give satisfaction,

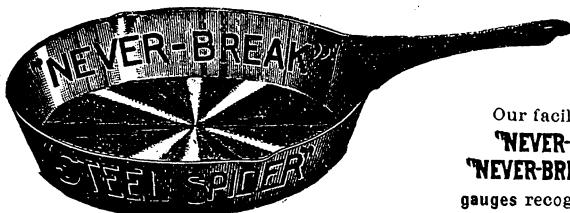
Respectfully yours, RUSSELL SAGE.

THE ROCHESTER LAMP CO.,
42 Park Place,
37 Barclay Street, { New York.

THEO. V. SMITH, Manufacturer,

54 John Street, New York.
Stationers' Tin Goods, i. e., Tin Boxes, Etc.
Hardwood Air Tight Cabinets for Cigars.
Jewelry and Games.
Wood Turnings and Enameling.
Baking Japans.
Jobbing, Japanning and Tin Shop.
Special work to order quick.





Steel Spiders, Griddles, Kettles, Maslins, Scotch Bowls, etc. Send for Catalogue and Discounts.

"NEVER-BREAK" Steelware.

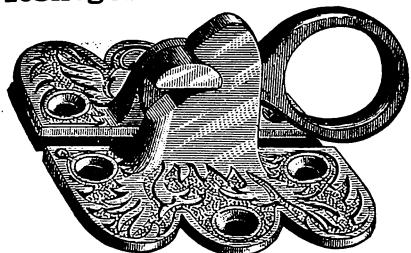
The "STANDARD" for Weight, Finish and Price

Our facilities are such that we can make immediate shipments.

"NEVER-BREAK" Spiders and Griddles are all made of 14 Stubbs' English Gauge and all "NEVER-BREAK" Kettles and other deep ware of 16 Stubbs' English Gauge. These are the only gauges recognized by the United States Government and the trade as "Standard."

THE BRONSON SUPPLY CO.,
NEW YORK AND CLEVELAND.

"CONROY"
Refrigerator Door Fasteners
Have rapidly supplanted all others.
Refrigerator Trimmings.



P. J. CONROY & CO., Paschal, PHILADELPHIA.

John Chatillon & Sons,

85, 87, 89, 91, 93 CLIFF ST., NEW YORK

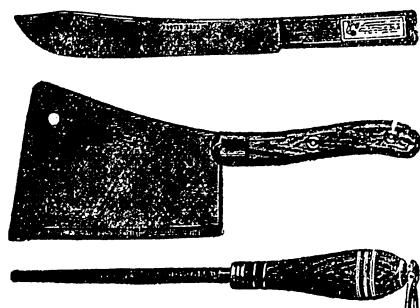
ESTABLISHED
1835.

SEND FOR
PRICE-LIST

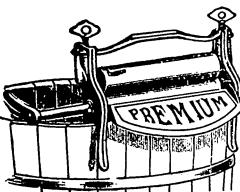
MANUFACTURERS
OF
SCALES
—AND—
BUTCHER TOOLS.

Sole Agents for

Foster Bros.' Butchers' Cutlery.



John Chatillon & Sons, N. Y.



COLBY WRINGER CO., - Montpelier, Vt.
MANUFACTURERS OF THE
Premium Wringer,
With Automatic Apron Adjustment.
SURPLESS, DUNN & ALDER, Direct Representatives,
15 Murray Street, New York.

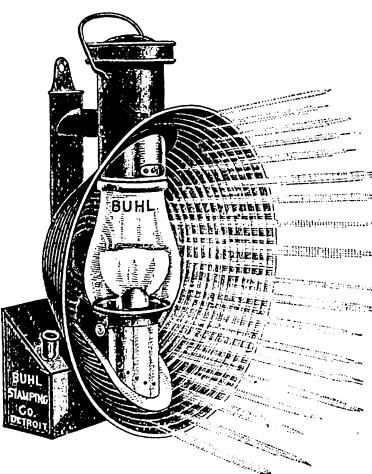


No. 8
Globe Street Lamp.

Light your Streets and Driveways.
The S. G. & L. CO.
**Tubular Globe
Street Lamp**

IS THE Best Street Lamp Manufactured.
Equal to the best Gas Light.
Will not Blow Out in the Strongest Wind.
Will not Smoke.
Will not Freeze.
Automatic Extinguisher.
Outside Wick Regulator.
Will Burn Four Hours for One Cent.

MANUFACTURED BY
STEAM GAUGE AND LANTERN CO.,
SYRACUSE, N. Y.
Western Branch, 25 Lake St., Chicago, Ill.



We can fill orders on the day
they are received for

BUHL TUBULAR HEADLIGHTS

No. 15 New Side Lift Lanterns.
No. 20 Buhl Top " "
No. 200 " " "

The Celebrated Buhl Dash
Reflector Lanterns.

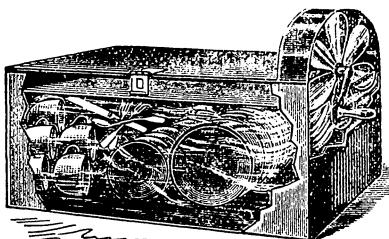
Every Buhl Lantern is tested before it
leaves our factory. Construction and quality
guaranteed. Send for our complete illus-
trated catalogue.

Buhl Stamping Co., Detroit, Mich.



NEW 1895 HOUSEHOLD SPECIALTIES.

ILLUSTRATED CATALOGUE WITH DISCOUNTS NOW READY.

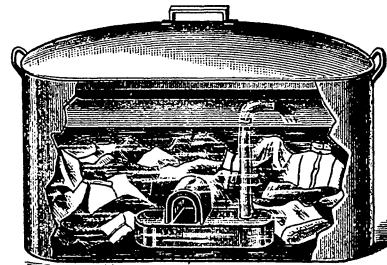


One-Minute Dish Washers.

Gas Soldering Iron, - \$2.
Soldering without a Stove. Iron always hot.

Gas Kitchen Iron, - \$2.
One Iron does all the work without a Stove.

Gas Heating Stoves,
Save 4-5 the cost of Gas. Heat intense.
No. 1, \$5; No. 2, \$7.50;
No. 3, \$10.



Steam Clothes Washer.

Gas Cooking Stoves,

The most perfect and even Cooker in the World.

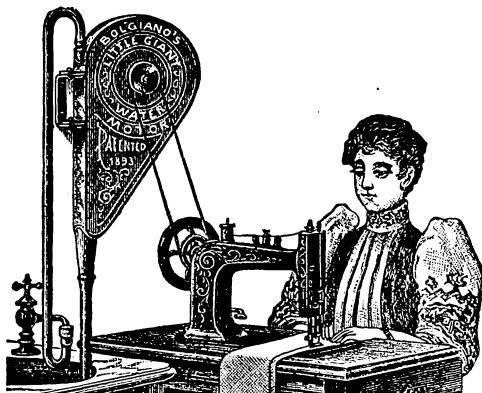
1 Burner \$1; 2 B., \$1.50; 3 B., \$2.

Clothes Washers, 50c.

Washes without scrubbing in 15 minutes.

Our Irons and Stoves Save 80% of Gas.

Water Motors, No. 1, For Sewing Machines, Fans, Dental Engines, \$5; No. 2, Fans, Ice Cream Freezers, Lathes, Scroll Saws, Church Organs, &c, \$10;
No. 3, Fans, Printing Presses, Grindstones, Coffee Mills, \$15. Washing Machines, &c.,



Little Giant Water Motor No. 1.

Dish Washers, - \$3.
Washes dishes in one minute, family, restaurant or hotel.

Kitchen Odor Consumer,
\$1.

Consumes all the Odor of the Kitchen while Cooking.

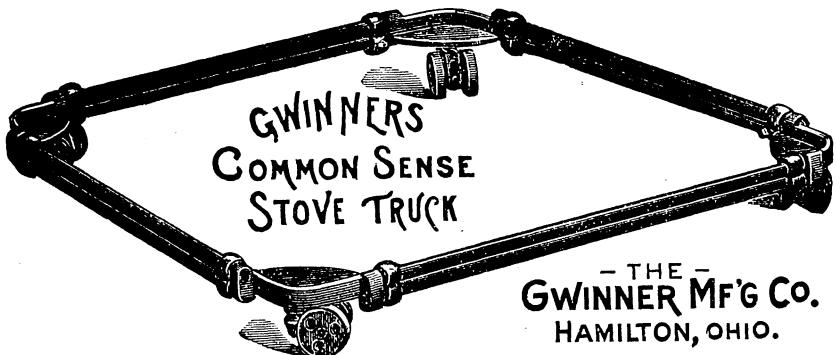
Dough Mixer, - \$2.
Mixes dough in 1-3 time, family, bakers and hotels.

The Bolgiano Mfg. Co.,

BALTIMORE, MARYLAND.



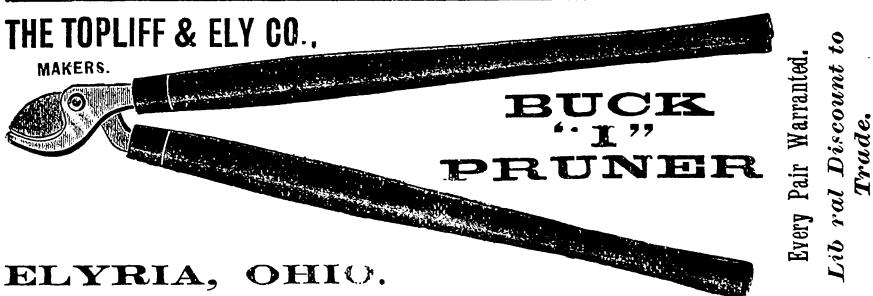
Bolgiano's Perfection Hot Air Gas Iron.



- THE -
GWINNER MFG CO.
HAMILTON, OHIO.

THE TOPLIFF & ELY CO.,

MAKERS.



ELYRIA, OHIO.

Every Pair Warranted.
Lib'ral Discount to
Trade.

Law without Lawyers.

A Compendium of Business and Domestic Law for Popular Use.

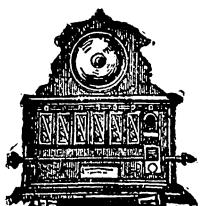
By H. B. COREY,
Member of the New York Bar,
PRICE, \$1.00. Post-paid.

A simple, clear and accurate presentation of the general laws, and of the laws of the several States relating to the rights of property, contracts, debts, partnerships, bankruptcy, insurance, corporations, marriage, divorce, &c., &c., with which are included correct copies of all legal instruments and forms, such as notes, deeds, mortgages, leases, wills, &c., and a dictionary of legal words and phrases.

DAVID WILLIAMS,

Publisher and Bookseller.

96 - 102 Reade St., New York.



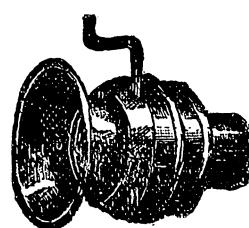
W. R. OSTRANDER & CO.,

204 FULTON STREET, NEW YORK.

Manufacturers of

SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC
MECHANICAL AND PNEUMATIC ANNUNCIATORS
AND BELLS.

Complete outfit of Speaking Tubes, Whistles, Electric, Mechanical and Pneumatic Bells. A full line always in stock. Send for new catalogue. Factory, DeKalb ave. near Knickerbocker, Brooklyn, N. Y.



We're So Afraid of the Income Tax

That to reduce our "profits" to the proper limit we expect to sell Phillips Screens unusually cheap the coming season.

"We don't say we are Democrats," but perhaps Uncle Sam will 'whack up' on losses if we do on "profits."

The quality of our product the coming season will remain first-class. We want to hang onto you until **by and by when the good times come** and we can once more make a "profit." Then, although **the American people put up with many things patiently**, they wouldn't stand it if our goods were to fail in quality, since for so many years they have known that **Phillips Screens are Reliable**.

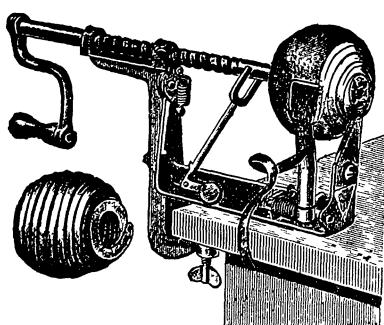
It's early to talk screens yet, but when you are ready to buy please remember that our experience, capital and capacity of 5,000 screens per day will enable us to make quality, quantity and price.

Phillips Snow Shovels are light, properly formed and well made from good materials

THE A. J. PHILLIPS CO., - **Fenton, Mich.**

IF
YOU
WANT

APPLE PARERS



We have all kinds, from seventy-five cents to twenty dollars each.

Our machines received highest award at the World's Fair. We are the oldest and largest manufacturers of Apple Parers in the world, and we make a larger variety than all others combined. If you are in need of Apple Parers write us. Our machines are sold by the jobbing trade everywhere.

GOODELL COMPANY,

ANTRIM, N. H.

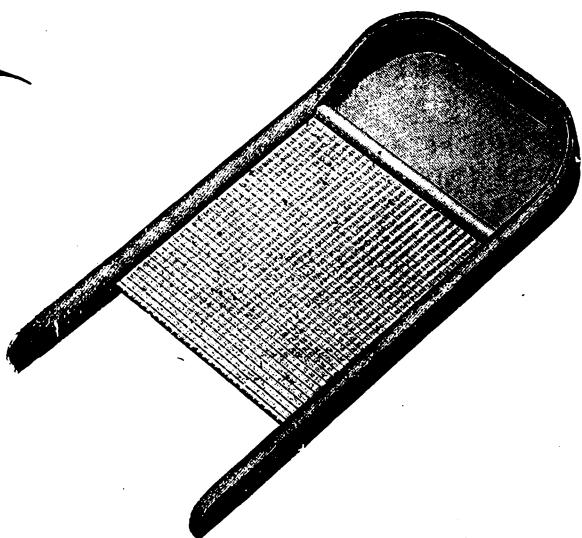
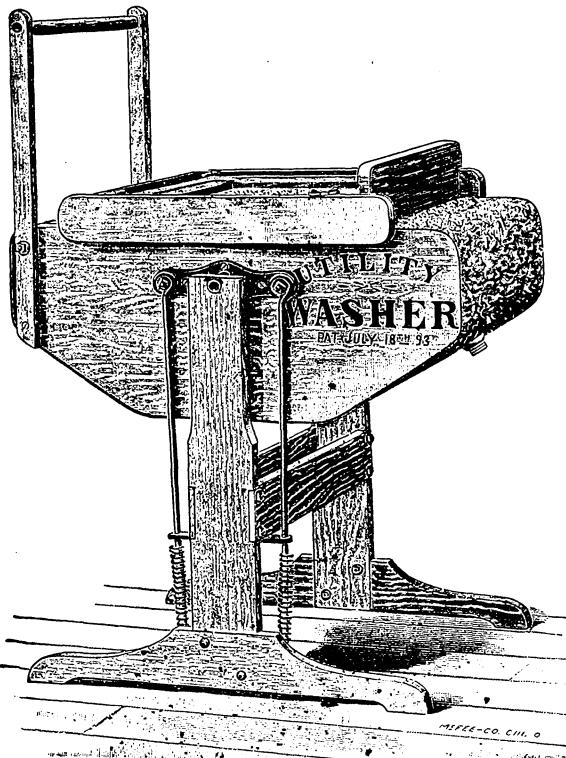
No. 6, CORN BROOM.

JOSEPH LAY & CO.,

RIDGEVILLE, IND.,
MANUFACTURERS OF
BROOMS AND BRUSHES OF ALL KINDS.
Those of the Heavier Work a Specialty.

FOR
RAILROAD, SHOP,
WAREHOUSE,
STREET, STABLE,
BLOOM,
CHILL, CASTING
and MOULDERS'
BRUSHES, &c., &c.

Utility



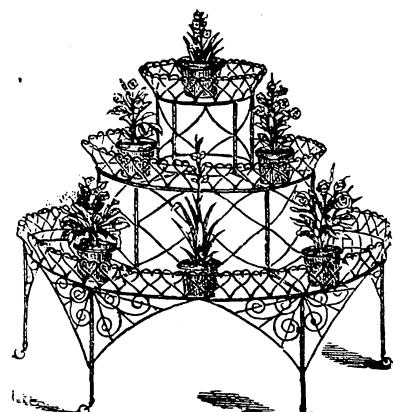
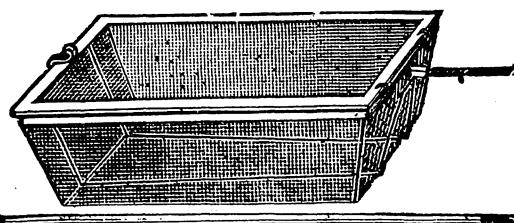
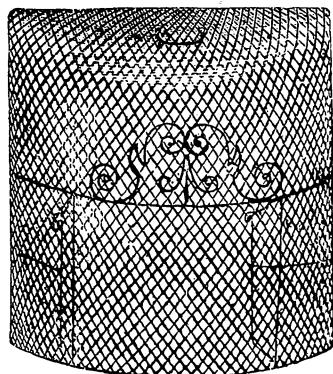
Washer and Board

Your customers can get along without both but neither separately. The washer has the peculiarity of washing the clothes clean and not wear out either it or the operator.

While the board is something entirely new yet thoroughly tested and proven the best made. Write for prices, please.

Olds Wagon Works,
Fort Wayne, Ind., U. S. A.

**THE FRED. J. MEYERS MFG. CO., HAMILTON,
OHIO,**



MANUFACTURERS OF
Wire Guards, Corn Poppers, Flower Stands,
Sieves, Screens, Bank and Office Wire
Work, Railing of every description.

FIRST CLASS GOODS. LOW PRICES.

F. J. MATTISON, Eastern Agt., 89 Beekman St., N. Y.

A GOOD PROFIT TO DEALERS

**A BALL BEARING WRINGER.
THE CLEVELAND.**

Runs like a bicycle. Very easy to operate, no other like it. Can be sold at higher prices and better profit than others, hence it pays to push it. It has been on the market over a year and is giving perfect satisfaction.

Send for Sample or Write for Catalogue and Prices.

ALL OTHER KINDS OF WRINGERS.

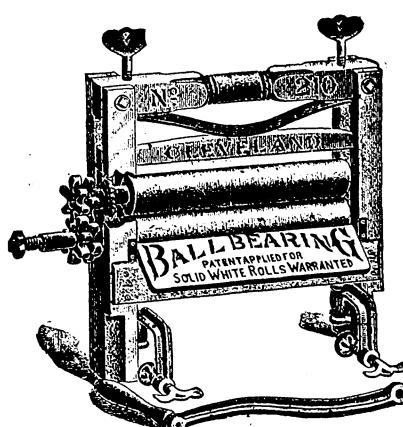
THE PEERLESS MANUFACTURING CO.,

CLEVELAND, OHIO.

We also make High Grade Bicycles.

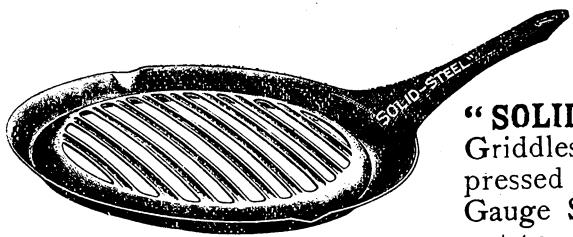
OSGOOD & HOWELL, Pacific Coast Agents.

132 Market St., San Francisco, Cal.



WE MAKE

SPIDERS,
GRIDDLES,
KETTLES,
SCOTCH BOWLS,
MASLINS,
STEW PANS,
STEW POTS,
BROILERS,
&c., &c.



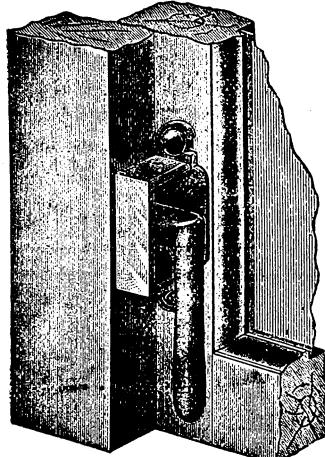
"SOLID-STEEL" Spiders, Griddles, and Broilers are pressed **HOT** from 14 Stubbs' Gauge Steel and guaranteed not to warp.

THE CLEVELAND STAMPING & TOOL CO.,
CLEVELAND, OHIO.

Light and Heavy Stamping and Blanking, Dies and Presses.

DOLBER'S
SASH FASTENER.

Patented Aug. 1, 1893.



BEST DEVICE EVER INVENTED FOR FASTENING
NEW OR OLD

Outside Windows.

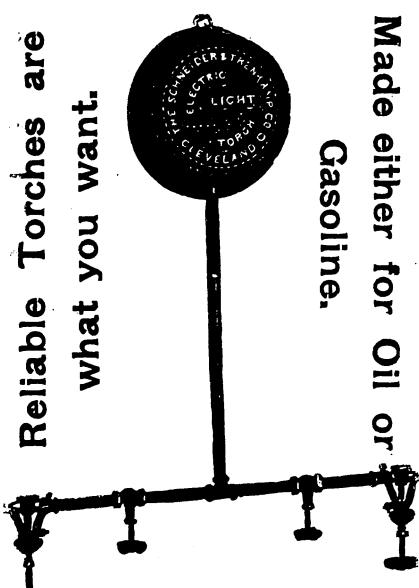
The above shows Fastener as applied to the side of an outside window, fastening same to the outside casing.

Saves Time, Labor and Expense.

Mounted samples by mail 15c.

F. V. WOOSTER, 66 Beverly St., Boston.

Reliable Torches are
what you want.



These Torches are particularly adapted for use in Factories, Foundries, Machine Shops, Rolling Mills, Blacksmith Shops, Warehouses, &c. They make a strong white light, are free from smoke and are not affected by wind or rain. They are convenient and portable. These Torches can be run at an expense of about one-half cent to one cent per hour, burning a bright, steady light which is ten times greater than the light of an ordinary gas burner.

Write us for prices. A liberal discount given to the trade. Manufactured by
THE SCHNEIDER & TRENKAMP CO.
Nos. 479 to 497 Case Ave., Cleveland, Ohio.

Made either for Oil or
Gasoline.



MERK CHRISTMAS TREE HOLDER!

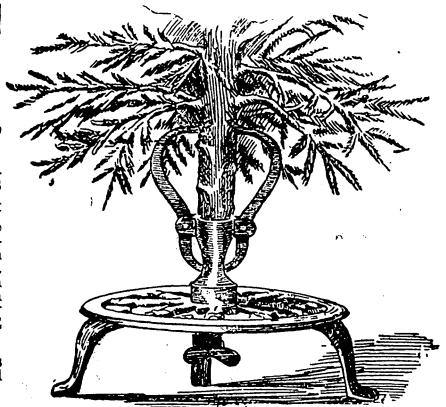
PATENTED SEPT. 1st, 1891.

BUY THE BEST.

Christmas comes but once a year

If you want to make your home pleasant and cheerful during the holidays BUY A MERK CHRISTMAS TREE HOLDER. Made of iron, neatly finished in gold bronze or japanned, a great improvement over any heretofore made. By an ingenious contrivance the tree is held secure by strong arms which extend backward from the main body of the receptacle in which it is placed. If desired the tree can be revolved. Samples and holders sent by express prepaid upon receipt of \$1. Packed in quarter and half dozen crates for shipment. Manufactured and sold only by the ALLEN TOWN HARDWARE WORKS, ALLEN TOWN, PA.

IF SOMETHING NEW.—Hardware dealers and others are requested to write for descriptive circulars and wholesale prices.



WHY DOESN'T FOOD COOKED IN
ALUMINUM WARE BURN?

The most satisfactory explanation of this remarkable characteristic of this new and beautiful metal is that it is such a wonderful conductor of heat that it distributes it instantly throughout the entire mass so that one part of the dish is no hotter than any other part. The function of the water in a milk boiler is that of a heat distributor. You have noticed in an ordinary tin or enameled utensil how the contents begin to boil at one or two points and continue to boil more and more fiercely until—they burn on! The heat is not quickly and evenly distributed as it would be if the utensil was made of aluminum. And then—aluminum is so light, so pure and cleanly, absolutely non-poisonous. No rusting or corroding. No enamel to flake off and will cook in one third less time than other utensils. They cost a little more at the start but will last indefinitely with ordinary care and are much better all the time. Samples will interest your customers and please your best trade.

— MANUFACTURED BY —

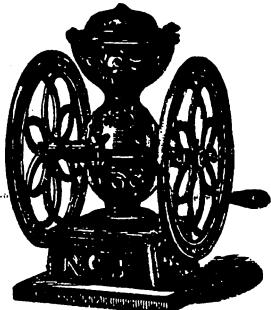
SIDNEY SHEPARD & CO., | C. SIDNEY SHEPARD & CO.,
BUFFALO, N. Y. | CHICAGO, ILL.

THE ENTERPRISE M'F'G CO. OF PA.

New York Branch, J. C. McCarty & Co., 97 Chambers St., N. Y. THIRD and DAUPHIN STS, PHILADELPHIA.

COFFEE MILLS.

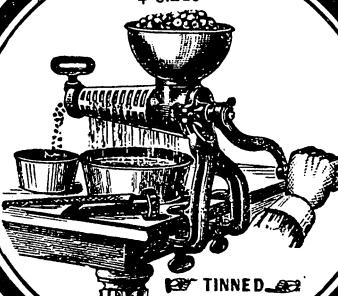
28 Sizes.



\$1.25 to \$100.00.

FRUIT PRESS.

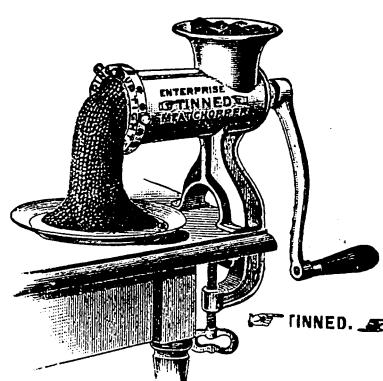
4 SIZES



No. 24, Price, \$3.00

MEAT CHOPPERS.

16 Sizes.



\$2.00 to \$275.00.

FOR SALE BY THE HARDWARE TRADE. SEND FOR OUR LATEST CATALOGUE.

HARDWARE DRAWERS.



THE WERNICKE SYSTEM
OF STORE FIXTURES.

It is new, novel and unequalled for beauty
convenience and economy.

Send for Descriptive Circulars.

THE WERNICKE CO.,

Manufacturers of General Store, Bank and Office Furniture,

No. 125 WILDER STREET, MINNEAPOLIS, MINN.

Logan & Strobridge Iron Co.,

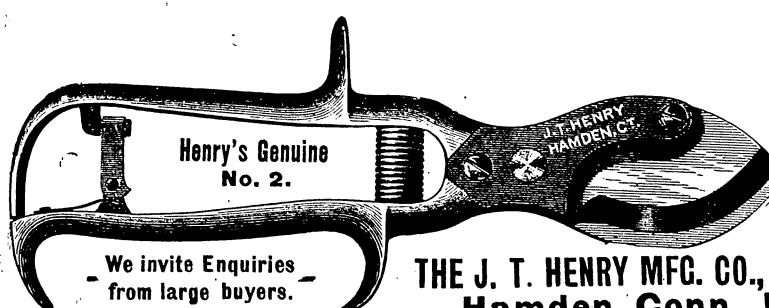
NEW BRIGHTON, PA.

Christmas Tree Holders.

Fits All Sizes of Trees.



Handsomest,
Cheapest,
Best
in the market.

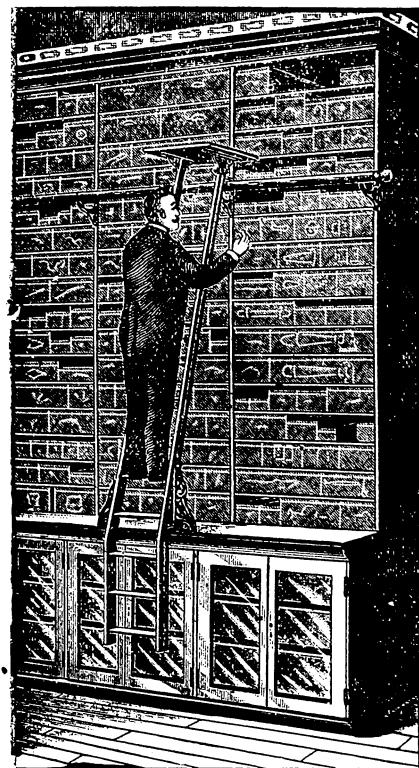


We invite Enquiries
from large buyers.

THE J. T. HENRY MFG. CO.,
Hamden, Conn., U.S.A.

THE BICYCLE STEP LADDER.

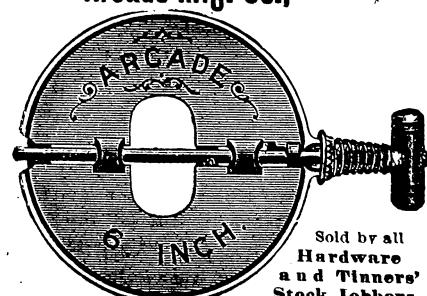
Especially adapted for Hardware Stores.



The newest, neatest, simplest, easiest operated and safest store ladder made. Highest Award World's Fair. Write us.

The Bicycle Step Ladder Co., 50 State Street,
Chicago, Ill.
N. Y. Agency, E. J. HUSSEY & CO., 80 John St.

Made by **Arcade Mfg. Co., Freeport, Ill.**



Sold by all
Hardware
and Tinner's
Stock Jobbers.

N. R. STREETER & CO.,

Manufacturers of SAD IRONS AND HARDWARE.



"SENSIBLE" MINCING KNIVES.

Tempered Steel Nickel-Plated Blades.

Multiple-Bladed Means Rapid Cutting.

These goods have become the standard of the market.

Our line of Sensible Mincing Knives covers all points where other Multiple-Bladed Knives fail.

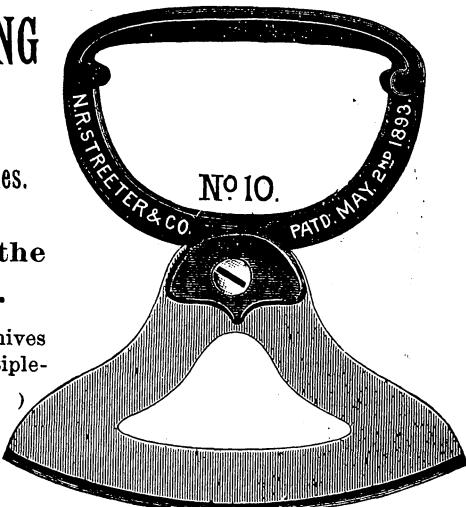
BLADES can be REMOVED when they need sharpening. Easy to clean.

Write for our 1894 Catalogue and get our Prices.

Factories, Rochester, N. Y., Pottstown, Pa.

General Office, Groton, N. Y.

N. Y. Office, W. H. JACOBUS, 90 Chambers St.



PATENT APPLIED FOR.
The Steel Stretcher Handle,
for Mrs. Potts' Sad Irons,
in Hazel Wood only.

No. 110.

The Cleveland Wood Turning Co.,
710-726 Scranton Ave., Cleveland, O.

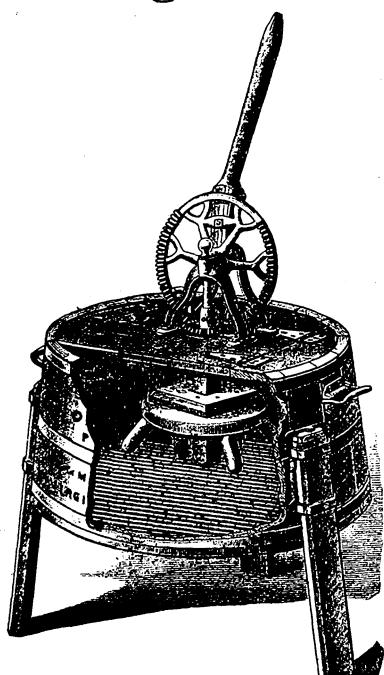
Special work in Handles and Wood Turning of all kinds. Our line of regular made Tool Handles is the best.

New York Office:
W. H. JACOBUS,
No. 90 Chambers St.



Walnut, Japanned, No. 1.
Walnut, Tinned, No. 2.
Hazel, Japanned, No. 10.
Hazel, Tinned, No. 20.

The Columbia Washing Machine.



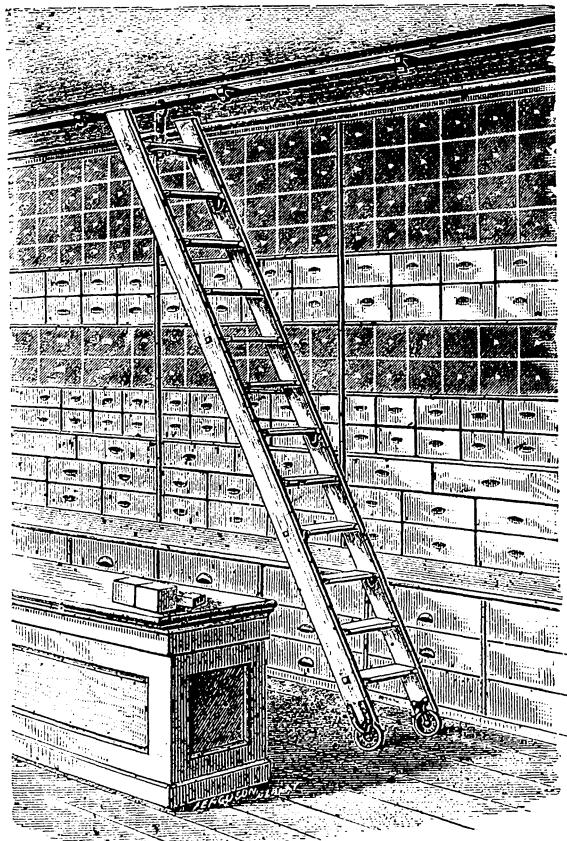
Made of best selected Virginia White Cedar. Extra heavy hoops and castings, and the only machine with Galvanized Hoops, Castings and Trim-mings.

Sides and Bottom Corrugated.
Prices and Catalogue Sent for the Asking.

PRESCOTT BROS., 64-66 Cornhill, Boston, Mass.,
Agents for New England.

RICHMOND CEDAR WORKS,
Manufacturers of Woodenware, RICHMOND, VA.

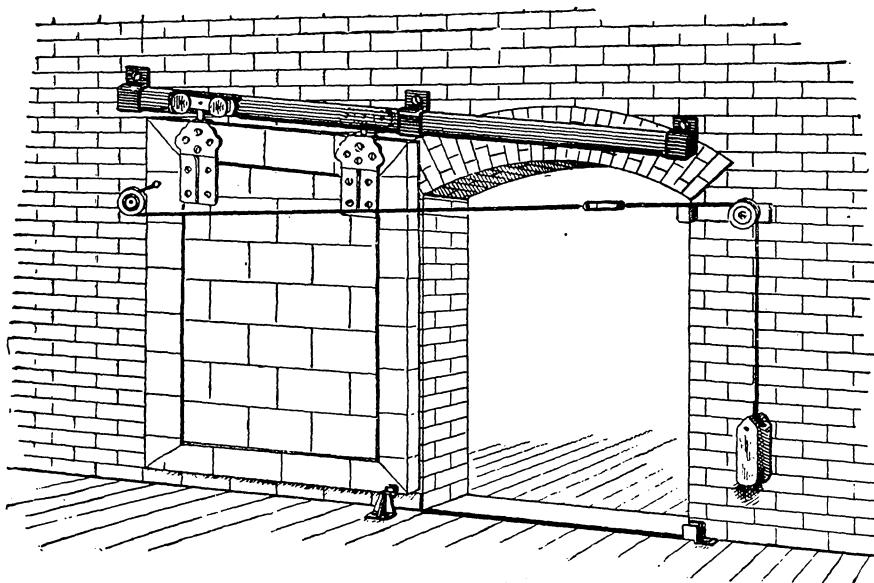
THE "NOISELESS" STORE LADDER.



The latest and best. Perfectly noiseless. Neat in appearance.
Manufactured by

M. CROISSANT,
ALBANY, N. Y.

THE COBURN SELF CLOSING FIRE DOOR.



EQUIPPED WITH AUTOMATIC FIRE DOOR FITTINGS.

The only absolutely fireproof runway in the world. This can be applied to brick walls at a less expense to builder than any other device. No woodwork to warp, wear or burn or to protect with a covering of tin. Track cannot be twisted off the wall by excessive heat, and in case of fire the door will hang as long as wall stands, the track being bolted direct to the brick walls. More easy to apply than any other fixture.

GET our CATALOGUE of
Door Hangers

— AND —

TROLLEY STORE LADDERS.

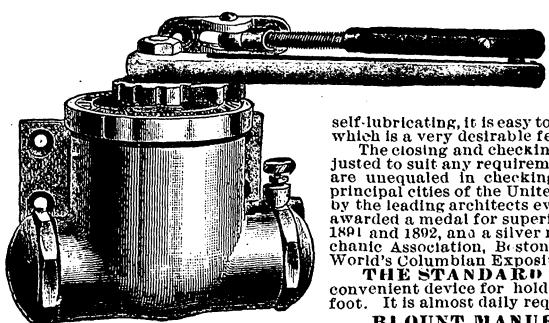
COBURN TROLLEY TRACK MFG. CO., HOLYOKE, MASS.

New England Agent, L. H. Tourtellotte, No. 94 Pearl St., Boston, Mass.; New York Agents, H. B. Newhall Co., No. 105 Chambers St.; Philadelphia Office, No. 721 Jayne St.; San Francisco Agents, Palace Hardware Co., No. 603 Market St.



We
are now prepared
to promptly fill all orders
for the

WARNER BURGLAR PROOF LOCKS.
The Cheapest, Strongest, Lightest Dead Rim Lock made.
Write for Prices and Circulars.
THE WARNER LOCK CO.,
412 Manhattan Bldg.,
Chicago, Ill.



After five years of extensive use

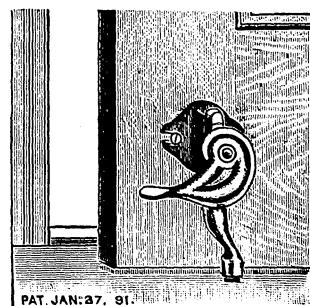
The Blount Door Check and Spring

is acknowledged generally to be the best on the market. Being free from packing friction, and its interior parts self-lubricating, it is easy to open (the only resistance being the tension of the spring), which is a very desirable feature.

The closing and checking power is under direct control and can be quickly adjusted to suit any requirement. They are made in sizes suitable for any doors, and are unequalled in checking power. There are many thousands in use in all the principal cities of the United States, and in other countries. They are recommended by the leading architects everywhere, and once tried are always used. They were awarded a medal for superior merit by the American Institute in New York, 1890, 1891 and 1892, and a silver medal and diploma by the Massachusetts Charitable Mechanic Association, Boston, 1892, and a medal and diploma for superior merit by World's Columbian Exposition, 1893.

THE STANDARD DOOR STOP OR HOLDER. A new, novel, and convenient device for holding doors at any angle desired and operated with the foot. It is almost daily required on public and private doors. Send for circular.

BLOUNT MANUFACTURING CO., - BOSTON, MASS.



PAT. JAN. 27, 91.

IN USE

A practical means of rapidly reaching absolutely accurate results without the mental wear of computing.

It gives at a glance the net of any sum at a great range of discounts, simple and complex, and it is accurate, rapid and practical. Price, \$3.00; Double Indexed Edition, \$4.00.

LADD'S DISCOUNT Book.

Mailed, postpaid, upon receipt of price by DAVID WILLIAMS, 96-102 Beale Street, New York.

Russell & Erwin Mfg. Co.,

NEW BRITAIN, CONN. NEW YORK. PHILADELPHIA. BALTIMORE. LONDON.

“Arabian” Design.

Antique Copper Finish.



Sash Lift No. 7854.



Sliding Door
Escutcheon No. 7837.



Butt No. 7084, 4½ x 4½.
(Illustration Three-quarter Size.)

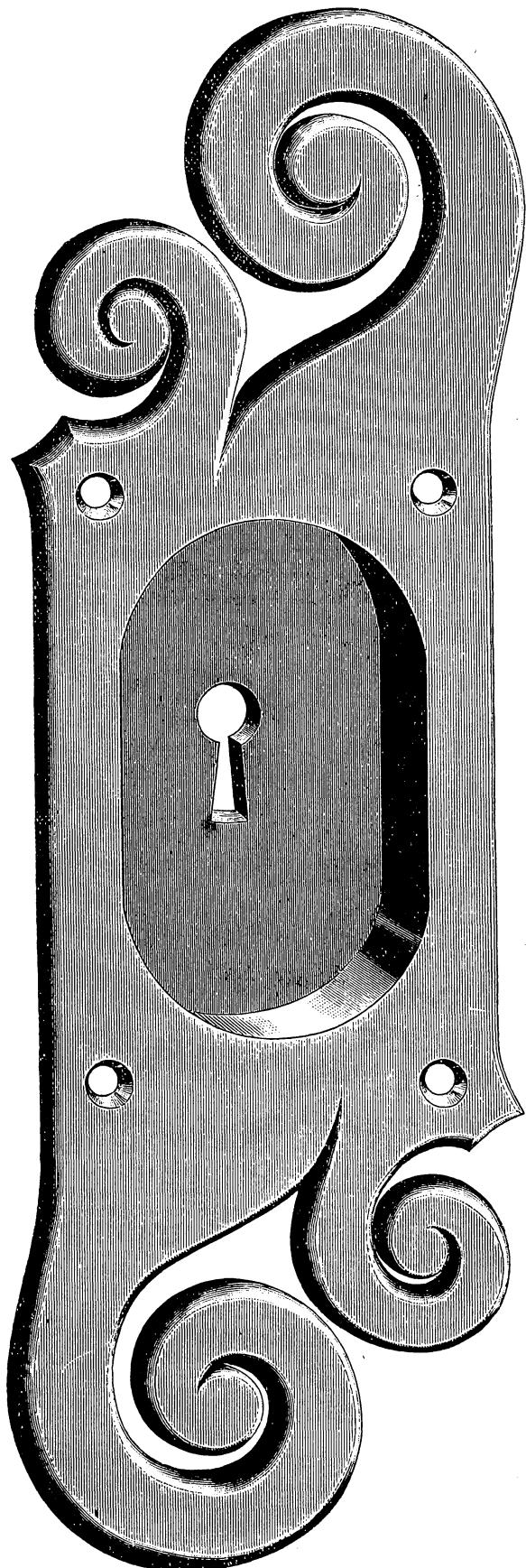


Knobs No. 7687.
Escutcheon No. 7858½.

MANUFACTURERS OF

COLUMBIA CYLINDER FRONT AND OFFICE DOOR LOCKS.

READING Hardware Company



MANUFACTURERS OF
**ARTISTIC
HARDWARE.**

**BRONZE
CABINET
TRIMMINGS**

**“VASSAR”
CYLINDER LOCKS.**

“VASSAR” Rim Night Latches,
And “VASSAR” Rim Dead Locks.

With our Patent Self-Adjusting Connecting Spindle, which does not have to be cut off or filed. Adjusts itself to different thicknesses of door.

**FINE
BIT-KEY
DOOR LOCKS.**

**“ DUPLEX ”
WROUGHT BUTTS.**

Stores and Sample Rooms:
NEW YORK, 96 and 98 Reade Street.
PHILADELPHIA, 514 Commerce Street.
CHICAGO, 73 Wabash Avenue.

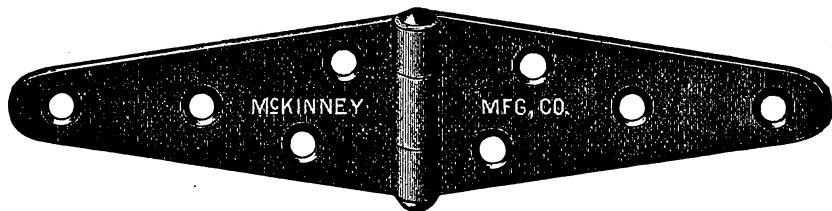
FACTORIES AND MAIN OFFICE, READING, PA.

STEEL HINGES AND BUTTS.

—STANDARD GOODS.—

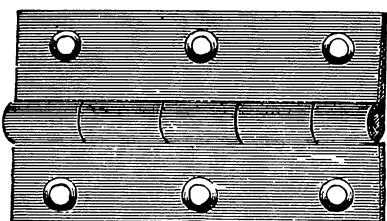
McKINNEY MFG. CO., - ALLEGHENY, PENN.

SEND FOR
LIST.



ORDERS FILLED
ON SIGHT.

“NONE BETTER.”

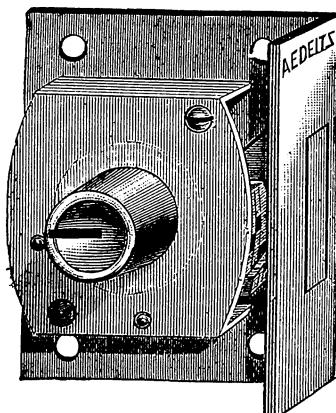


Cast Brass Butt Hinges

IN STOCK AND FOR SALE BY

W. & J. TIEBOUT,
Nos. 16 & 18 Chambers Street, New York.
MANUFACTURERS OF
BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.

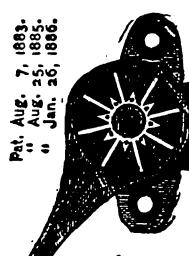
A. E. DEITZ



No. 51 Lock.

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts., New York.

Factory, BROOKLYN, E. D., N. Y.



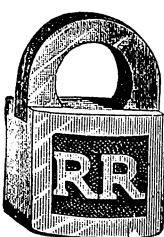
The Champion SIDE SASH LOCK

Has by its unequalled merits gained the public favor. It is a safe ventilator and prevents rattling. Is neat, cheap, simple and durable. It has been in extensive use for over eight years, and has become a staple article with the Hardware trade.

Beware of Worthless Imitations.

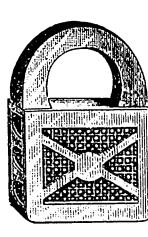
THE

Champion Safety Lock Co., Cleveland, O.

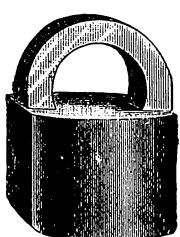


No. 406.

Our goods are the most desirable in every respect. Send for catalogue and prices of our large and complete line.



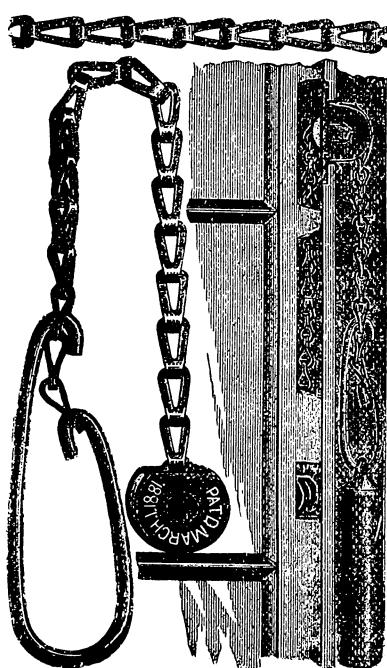
No. 303.



No. 505.

UNION LOCK & HARDWARE CO., Ltd.,
LANCASTER, PA.

THE SMITH & EGGE MFG. CO.,
BRIDGEPORT, CONN.



THE GIANT METAL SASH CHAIN

is a substitute for cord in hanging weights to windows. It is manufactured by us only, and by automatic machinery, patented and owned exclusively by ourselves, and whereby we secure uniformity of construction and quality. We have been to great expense in producing a metal having all the qualities and conditions requisite for making suitable chain for this purpose, and to prevent other chain of the same pattern of link and of the same general appearance, but made from an inferior metal, being offered as the same thing, we patented the word "Giant" as a Trade-Mark, as applied to either metal or chain. Trade-Mark Registered April 16, 1878, and October 22, 1878, and our metal is therefore known in the market as "Giant Metal," and our chain as "Giant Metal Sash Chain."

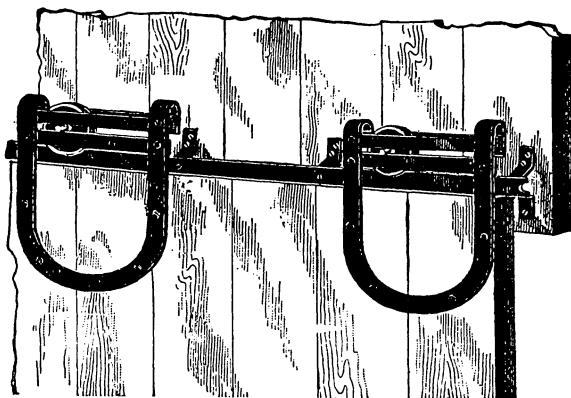
THE GIANT PADLOCK.
Centennial Award "Superior in Every Respect."

This is one of the best selling locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very handsome in appearance, and every Lock is warranted. Orders solicited.

Pat. Aug. 27, 1885.
Aug. 27, 1886.
Jan. 20, 1886.
= = =

THE CLARK MFG. CO.,

Blind Hinges, Gate Hinges, Door Butts,
And other HARDWARE SPECIALTIES,
BUFFALO, N. Y.



Lane's Patent Steel Barn Door Hangers,

"O. N. T." Track for same.

The first Anti-friction Steel Door Hanger placed upon the market and to-day stands as the original and best. Sold in all the States of the Union, as well as abroad. Also Lane's Noiseless Steel Parlor Door Hanger, using Single Steel Track, a great success.

Lane's Pat. Self-measuring Faucet, measuring liquids as drawn. Swift's Coffee Mills in great variety.

Manufactured by **LANE BROS.**, Poughkeepsie, N. Y.

JOHN H. GRAHAM & CO., General Agents, 113 Chambers St., NEW YORK.

Defies Competition for Quality and Price.

PATENT PERFECTION

Eight Tumblers. Key turns both ways

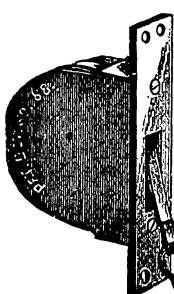
PADLOCK.

Sizes, $\frac{3}{4}$ inch to $2\frac{1}{4}$ inches, of cast bronze. No steel or iron used, cannot rust, and cannot be picked. Also, $\frac{1}{2}$ and $\frac{5}{8}$ inch Padlocks, opened with a common pin, in brass and nickel, for cats and small dogs. The best Railroad Switch and Car Lock in the world.

Adopted by the United States Treasury for bonded warehouses.

AMES SWORD CO., Chicopee, Mass.

Send for Price-Lists and Circulars.



DOES IT PAY?

To buy an inferior article, which your trade condemns, when you can get

THE CALDWELL SASH BALANCE.

The best material, right principle and care in making and testing have made it the **LEADER** for five years. Write to

CALDWELL MFG. CO., Rochester, N. Y.



STAR LOCK WORKS, PHILA.

W. & L. WOLF,

MANUF'R'S OF

1ST QUALITY ONLY

SCANDINAVIAN

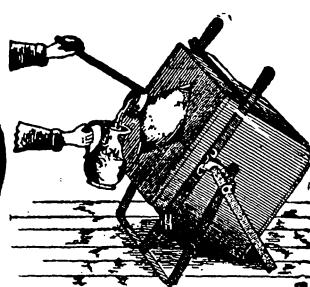
AND

Spring Padlocks,

Trunk & Case Locks,

Carboy Stands, &c.

Catalogues Sent on Application.



WHY USE WOODEN OR HEAVY STEEL BLOCKS

WHEN THE STEEL AND IRON

TACKLE BLOCKS

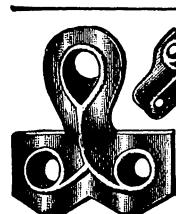
—MADE BY—

The Cleveland Block Co.,

CLEVELAND, OHIO, U. S. A.,

ARE BETTER IN EVERY WAY.

General Agents: Topping Brothers, 92 Chambers Street, New York. New England Agents, - Dodge, Haley & Co., 212 High Street, Boston.

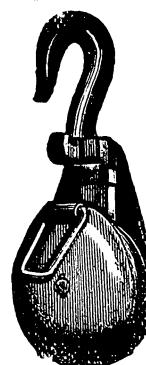


HEADQUARTERS FOR

**TINNERS' HARDWARE &
ROOFERS' SUPPLIES.**

Largest stock, greatest variety. Prices lower than ever. Write us before buying elsewhere.

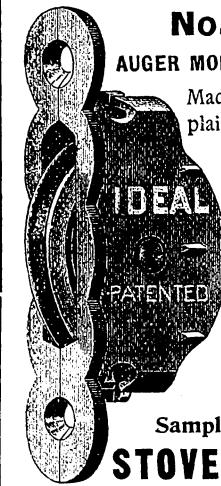
BERGER BROS., Philadelphia.



Ideal Sash Pulley

No. 60-65.

AUGER MORTISE—FACE PLATE.



Made with two inch wheel, plain and polished, cone axle bearings, noiseless and easy running; markers on the side to lay off the centers to bore the holes by.

The best and most uniformly made low-priced Sash pulley on the market.

Sample Free.

STOVER MFG. CO.,
145 River St., Freeport, III.

SASH WEIGHTS

E. E. BROWN & CO.,

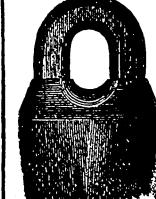
McKean and Meadow Sts.,

PHILADELPHIA, PA.

ESTABLISHED 1879.

KEYSTONE LOCK WORKS.

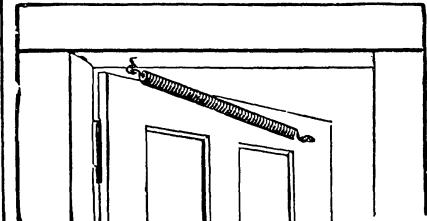
E. T. FRAIM, Lancaster, Pa., U. S. A.



Originators, designers, patentees and manufacturers of all the leading popular styles of **PADLOCKS**, Key-Locking Scandinavian with our patent Interlocking Tumblers; the only reliable lock of this style ever made. **SELF-LOCKING** Scandinavian of the highest type of perfection. Dust Proof Railroad, Freight Car and Switch Padlocks. Brass, Bronze, Steel and Malleable Iron Padlocks for all purposes and in all finishes. 131 different kinds. Write for our new 100-page catalogue.

SUPPLESS, DUNN & ALDER, General Agents,
97 Chambers St., NEW YORK.

THE PERFECT DOOR SPRING.



Cheap, Simple, Durable, Effective.

Best Screen Door Spring made. Send for our list of references, comprising some of the first houses in the land. They sell readily, and that is what you are looking for. Drop us a postal.

COILED WIRE BELTING CO.,
40 & 42 Noble St., Jersey City.

"STEEL HORSE SHOES."

SHOENBERGER & CO., PITTSBURGH, PA.,

After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



Juniata Steel Toe Calks.

We would also call your attention to our improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities, use sand or borax in welding on the Calk and cool off at a dark, or still better, cool off without plunging in water.

No. 1, 2, 3, 4, 5 and 6. Packed in 25 lbs.

Soft Steel Horse Shoe Bar, All Sizes.

No. 2 EXTRA SWAGED HIND.

The advantages of these shoes are that, being made of vastly superior material, they will never show signs of red-shortness or cold shortness, will never split in the crease and will always show a much finer finish than any iron shoe.

We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows:

No. 1, 15 more shoes to the keg. No. 3, 10 more shoes to the keg.

" 2, 14 " " " " " 4, 8 " " " "

And other sizes in proportion.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

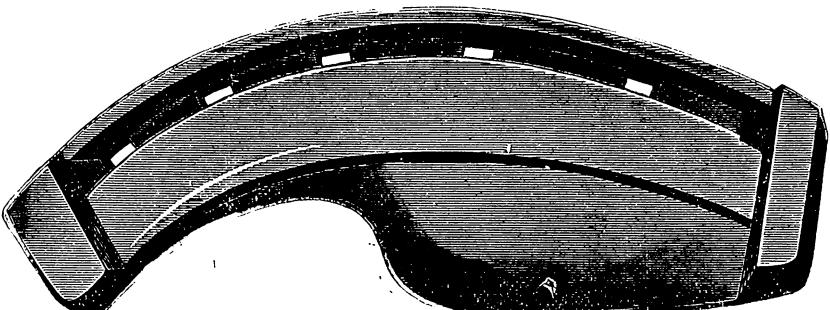
Write to us for information and prices, or apply to jobbers and dealers, who sell them everywhere.

SHOENBERGER & CO.,

JUNIATA IRON AND STEEL WORKS, - - - PITTSBURGH, PA

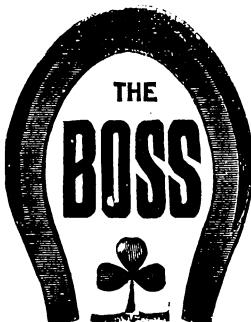
SCRANTON FORGING CO.,
SCRANTON, PA.
CARRIAGE HARDWARE AND
SPECIAL DROP FORGINGS.

FORGED
OX
SHOES.



Made under Deeble's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.
IT IS JUST RIGHT.



HORSE AND MULE SHOES.

Superior Quality, Shape and Finish.

BRYDEN HORSE SHOE CO.,

CATASAUQUA, PA.

RHODE ISLAND PERKINS HORSE SHOE CO.,

MANUFACTURERS OF

Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES—X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, Pres. C. H. PERKINS, Gen. Manager, R. W. COMSTOCK, Sec'y.

J. C. McCARTY & CO., Agents - 97 Chambers Street, New York.



Elegant Iron.

Beautiful Shape.

HORSE SHOES,

Light, Medium and Heavy.

MULE SHOES,

Light, Medium and Heavy.

Illustrated booklet and prices to all parts of the world on application.

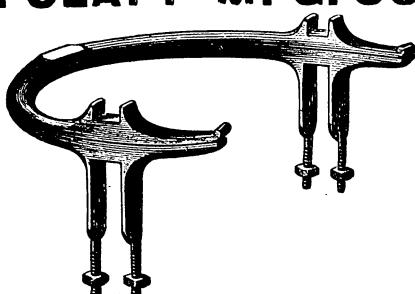
OLD DOMINION IRON AND NAIL WORKS CO.,

ARTHUR B. CLARKE, President.

Chicago Office, 45 La Salle St

Richmond, Va. U. S. A.

THE E. D. CLAPP MFG. CO., AUBURN, N. Y.



Drop Forgings of every kind from Iron or Steel.

Send for New Catalogue of Carriage Forgings.

BURDEN'S

HORSE SHOES.

“ Burden Best”

Iron

Boiler Rivets.

The Burden Iron Co.

TROY, N. Y.

PHOENIX

HORSE SHOES.

PHOENIX HORSE SHOE CO.

ROLLING MILLS AND FACTORIES,

Poughkeepsie, N. Y.

Joliet, Ill.

NEW YORK OFFICE, No. 66 Reade St.

Standard Horse Shoe Co.,

Manufacturers of

HORSE AND MULE SHOES.

Made from best quality of Scrap Iron and old Horse Shoes.

4 Liberty Square, Boston, Mass.



At Centennial Exposition
AT PHILADELPHIA. **HIGHEST AWARD** At World's Columbian Exposition
AT CHICAGO.

TO THE

PUTNAM

HOT-FORGED AND HAMMER-POINTED

HORSESHOE **NAILS.**

REGULAR HEADS for ordinary creased shoes.

CITY HEADS, or short heads for shallow creased shoes.

COUNTER HEADS for "Goodenough" shoes.

FRENCH HEADS for punched shoes, without creases.

These Nails are drawn from head to point from the BEST SWEDISH IRON RODS at a welding heat, thus: [diagram] by percussive hammer blows only; then polished by the water process, without the aid of acids, and hammer-pointed without any rolling or shearing.

They are the best because they are made of the best iron, and by the only process in which the iron is treated naturally, and its strength preserved.

Those who handle only the best goods hold the confidence of their customers.

Putnam Nail Co., Neponset, Boston, Mass.

H. D. SMITH & CO.

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

CHAMPLAIN

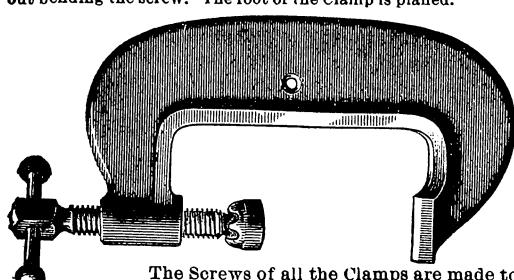
Manufactured by the NATIONAL HORSE NAIL CO.,
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents, New York.

LE COUNT'S HEAVY STEEL CLAMP.

Extra heavy, with Button on end of screw, hung on a ball so as to accommodate itself to irregularities without bending the screw. The foot of the Clamp is planed.

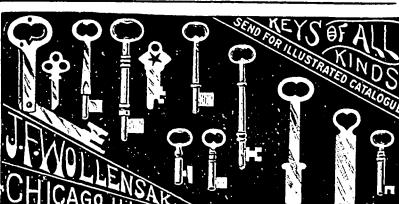
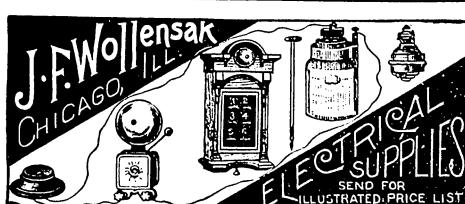


The Screws of all the Clamps are made to reach the lower number.

SEND FOR CATALOGUE OF FULL LINE OF MACHINISTS' TOOLS.

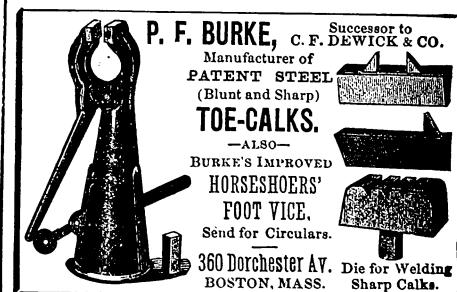
C. W. LE COUNT, MANUFACTURER, SO. NORWALK, CONN., U. S. A.

These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.



The Iron Age Standard Hardware Lists For Use in Price Books. Compiled by R. R. WILLIAMS, Hardware Editor of *The Iron Age*. These lists are supplied in pamphlet form and are intended to be cut out and inserted in *The Iron Age* Hardware Price Books. For this purpose they are printed on thin and tough paper of the best quality, and prepared with a special view to compactness and convenience of reference. Some of the lists are printed in more than one arrangement, permitting a choice of the best adapted.

For Sale by David Williams 86-102 Reade St., N. Y.



Crescent
Horse and Mule Shoes,
BAR IRON.

CRESCENT HORSE SHOE
IRON CO.
Max Meadows, Va.

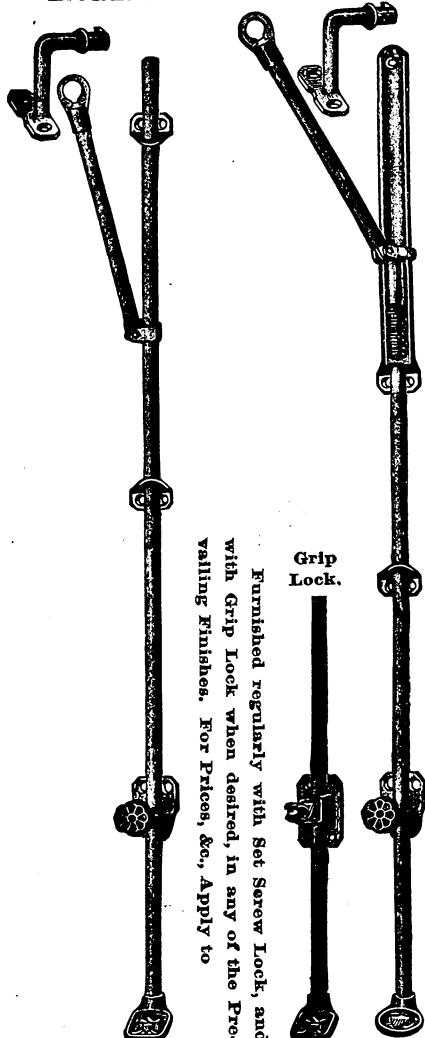


BICYCLE and other
DROP FORGINGS
Made to Order.
The Wilcox & Howe Co.,
Manufacturers of a complete line of
Carriage Hardware.
BIRMINGHAM, Conn.

TRANSOMLIFTERS

"EAGLE."

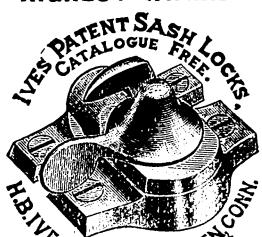
"SHIELD."



J. F. WOLLENSAK, PATENTEE
CHICAGO, ILLINOIS.

HIGHEST AWARD.

ALWAYS PLEASE.



ALWAYS SELL.

NO OTHER SASH LOCK IS SO WELL
UNDERSTOOD OR APPRECIATED
BY ARCHITECTS

HOW TO KEEP A STORE

BY S. H. TERRY.

406 PAGES, 5 x 7 1/2 INCHES.
POST-PAID, \$1.50.

Among the subjects discussed are: The selection of a business; choice of a locality; buying a stock of goods; examining, marking and arranging goods; how to advertise; employment of clerks; selling for cash and credit; keeping accounts; expenses; copartnerships; losses by fire, theft, &c.; influences of social life on business; buying at auction; investment of profits; insolvency; business qualifications.

DAVID WILLIAMS, Publisher & Bookseller

96-102 Reade St., New York.

RICHARD ECCLES,

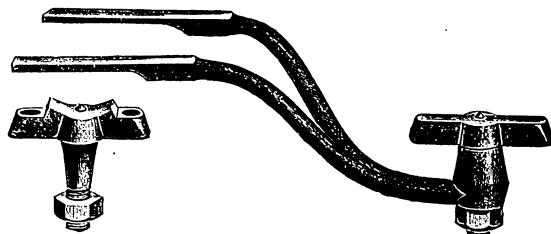
AUBURN, N. Y.,

MANUFACTURER OF

CARRIAGE FORGINGS,

Couplings, Clips, King Bolts, Fifth Wheels, &c.

SEND FOR SUPPLEMENT TO CATALOGUE



Showing a full line of Axle Clips, Spring Bar Clips, Three Piece Saddle Clips and King Bolt Yokes and Braces.

SEND FOR CATALOGUE AND SUPPLEMENT.

SASH WEIGHTS!

NORTON BROTHERS.

Manufacturers,

Office: 813 Masonic Temple, CHICAGO.

WORKS AT MAYWOOD, ILL.

Ball

For Stanley's Steel Butts.

Bearing

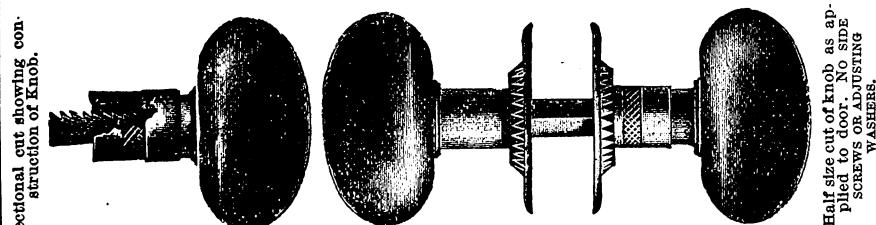


Washers

Doors hung with these Butts require no oiling, do not creak, work perfectly.

PRICES ON APPLICATION.

The Stanley Works, New Britain, Conn. 79 Chambers St., N. Y.



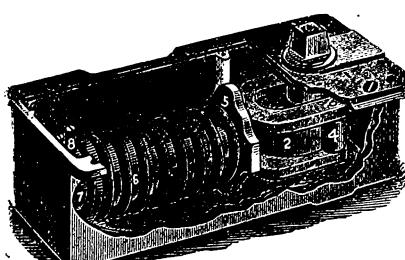
Don't you want your stock to represent the latest and most improved up to date Hardware? The Whipple Patent Door Knob is the latest and best Door Knob attachment ever made. Give it a trial.

PERRY & WHIPPLE CO., New Haven, Conn.

New York Sales Agent, E. G. SHEPARD, 142 Chambers Street.

HARDWARE DEALERS

CAN RECOMMEND THE

CHAMPION METAL WINDOW
SASH CHAINS

CHECKING SPRING HINGES

For Double or Single Acting Doors.

Applied in floor under door. They close the door gently, without noise or violence, and stop it at once at the center. Doors cannot sag, springs do not break or set. Send for new price-list.

J. BARDLEY,
140 & 151 Baxter St., New York

to their customers as a reliable substitute for Sash Cords, very strong and lasting (some in daily use ten years), and gives thorough satisfaction wherever used. The patented attachments are very simple and can be applied to any window.

MANUFACTURED ONLY BY

"THOMAS MORTON,"
65 Elizabeth Street,
NEW YORK.

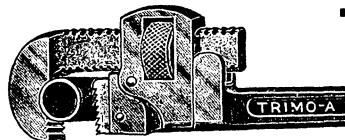
BUFFALO SCALE CO., Buffalo, N.Y. SCALES OF ALL KINDS.



Improved Adjustable S-Wrench.
Case-Hardened Throughout. Parts Interchangeable.

For Circulars and Price-List, address

BEMIS & CALL HARDWARE & TOOL CO.,
SPRINGFIELD, MASS., U. S. A.



TRIMO PIPE WRENCH.

Forged Steel.

All Parts Interchangeable.

Grips firmly without loss of motion. Releases readily. Never locks. Causes no trouble in close quarters. Does not crush the pipe.

The chain holds securely; cannot fall out even if used upside down. Readily releases when desired. Solid forged head. Fine quality of tool steel. Interchangeable gripping jaws.



TRIMO GIANT WRENCH.

Strongest and safest Pipe Wrench ever made. No slipping; no locking; no lost motion.

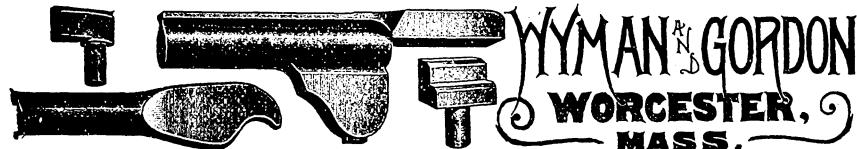
**TRIMO COMBINATION WRENCH
FOR NUTS**

AND PIPE.



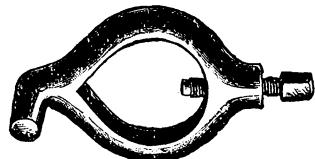
TRIMONT MFG. CO., Roxbury, Mass.,

DROP FORGINGS



**WYMAN & GORDON
WORCESTER,
MASS.**

Billings' Drop Forged Lathe Dogs



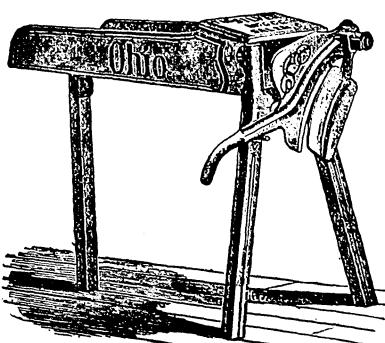
Drop Forged from Best Bar Steel,
and warranted a first-class
article.

CLAMP AND DIE DOGS OF THE SAME HIGH QUALITY

THE BILLINGS & SPENCER CO. - - - Hartford, Conn.

Drop Forgings of Every Description.

London House: Chas. Churchill & Co., 21 Cross St., Finsbury.



"OHIO" LEVER CUTTER

1894 PATTERN. PRICE \$5.00.

Simple, Durable,
Handsome and Cheap.

It has an eleven-inch Oil-Tempered Sickle Knife which can be adjusted to take up all wear, thus giving a perfect shear cut at all times.

Shipped K. D. to secure lowest freight rate, and can be set up in a moment.

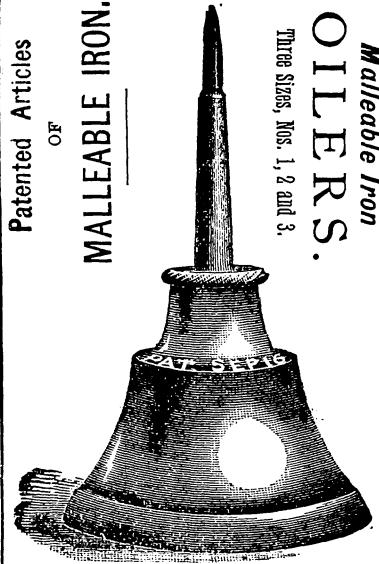
Send for Catalogue and Quotations on our Complete Line of Ensilage and Fodder Cutters.

THE SILVER MFG. CO., Salem, Ohio.

Patented Articles
OF

MALEABLE IRON.

Three Sizes, Nos. 1, 2 and 3.



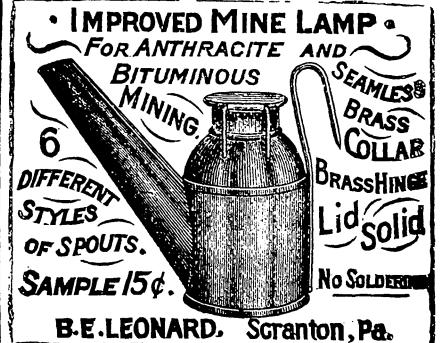
New Improved
PATENT
**Maleable Iron
OILERS.**

Hammer's Adjustable Clamps.
Male. Iron Hand Lamps.
M. I. Hanging Lamps.

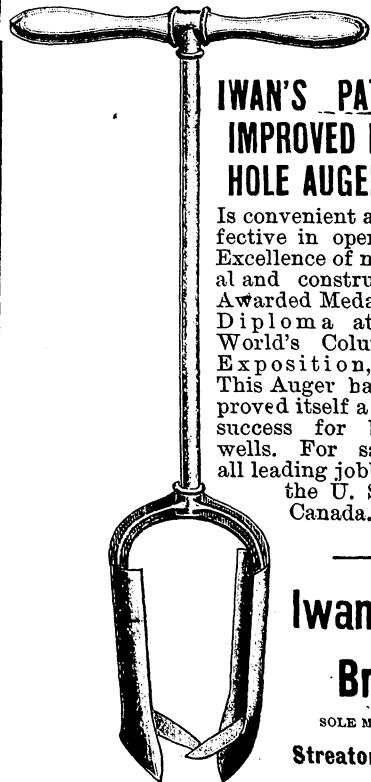
New Pattern Heavy Screw Clamps.
Strongest in the market.

For Sale by all the Principal Hardware Dealers.
SEND FOR PRICE LIST.
MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
in Maleable iron, made to order.

HAMMER & CO., Branford, Conn.



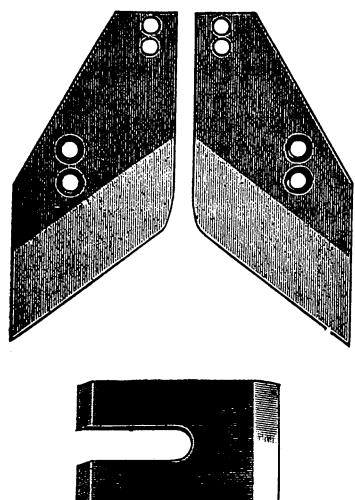
B.E. LEONARD, Scranton, Pa.



IWAN'S PATENT IMPROVED POST HOLE AUGER.

Is convenient and effective in operation. Excellence of material and construction. Awarded Medal and Diploma at the World's Columbian Exposition, 1893. This Auger has also proved itself a great success for boring wells. For sale by all leading jobbers in the U. S. and Canada.

**Iwan
Bros.,**
SOLE MNFRS.,
Streator, Ills.

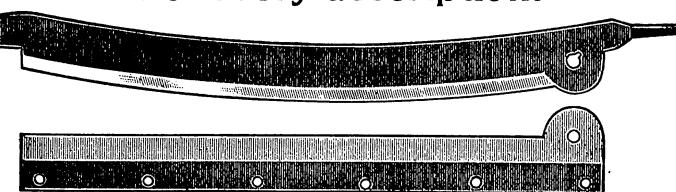


LORING COES & CO.,

WORCESTER, MASS.

Manufacturers of **MACHINE KNIVES.**

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies. Lawn Mower and Hay Cutter Knives of every description.



THE
"Columbia"
Trade-Mark.
**SOCKET
FORKS.**

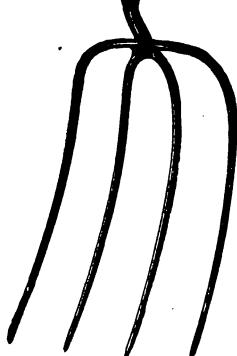
Made in Hay
Manure and Spad-
ing Fork Patterns.

Heavy and long
Steel Socket. Most
elegant goods ever
made.

The Iowa
Farming Tool Co.,

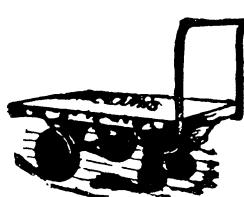
Makers of
**FORKS, HOES,
RAKES,
SCYTHE
SNATHS. Etc.**
For export and
home trade.
Catalog free on ap-
plication.

FT. MADISON,
IOWA, U. S. A.

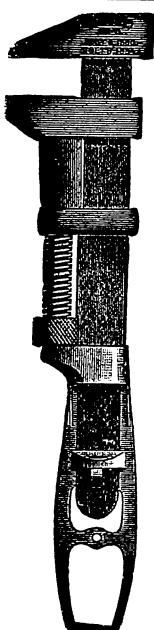


TRUCKS of all
kinds. Mounted
on rubber or
iron wheels. Trucks
made to order.
Write for prices.
Catalogues free.

G. P. CLARK, Box 0,
Windsor Locks, Conn.



**Electric Traction on Railways and Tram-
ways.** By A. BEEKENZAU. The author has en-
deavored in this book to summarize as concisely as
possible the present state of electric traction and
to describe the various methods and constructive
details which are to-day in use or which have
marked consecutive steps in the development of
the art. 213 illustrations, 12mo cloth \$4.00
For sale by DAVID WILLIAMS, 96-102 Reade St., N.Y.



L. COES'

Genuine Improved
KNIFE HANDLE
PATENT

Screw Wrenches

MANUFACTURED BY
COES WRENCH CO.,
WORCESTER, MASS.

Established in
1839.

Registered
March 31, 1874.

Patented July
6, 1880.

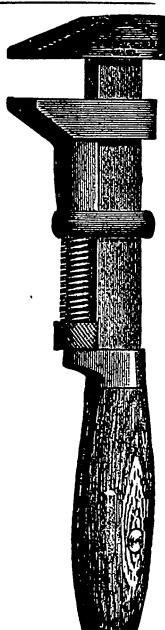
Patented July
8, 1884.

Sectional View Illustrates our New Knife Handle, showing Malleable Iron Frame and Shank of Bar keyed into the Handle.

Straight Bar, Extra Long Nut for Screw in Jaw.

The BEST MADE and STRONGEST WRENCH in the MARKET.

J. C. McCARTY & CO., JOHN H. GRAHAM & CO., } New York Agents.



SASH WEIGHTS.

KINGS COUNTY IRON FOUNDRY,

Office and Works, Nos. 86, 88, 90, 92 North 12th St.,
BROOKLYN, N. Y.



UNIVERSAL POST HOLE DIGGER.

We make 6 styles of Post Hole Diggers. We are headquarters on this line of goods. Beware of cheap imitations offered as "Just as good as Kohler's." There is no comparison and you will never want a second lot.

Write for circulars of our Lawn Sprinklers, New Lawn Rakes, Curry Combs, Can Openers, Kettle Cleaners, Hand Corn Planters, Saw Sets, etc., etc.

F. E. KOHLER & CO., - Canton, O.



ALUMINUM

Ingots, Sheets, Rods, Tubes, Wire and Castings, Cooking Utensils and Table Ware, Tea and Coffee Pots, Chafing Dishes, Rice Boilers, &c.

WRITE FOR THE WOHLER ALUMINUM COMPANY,
NEW CATALOGUE. 55 Jackson Street, Chicago, Ill.

ESTABLISHED IN 1848.

INCORPORATED IN 1877.

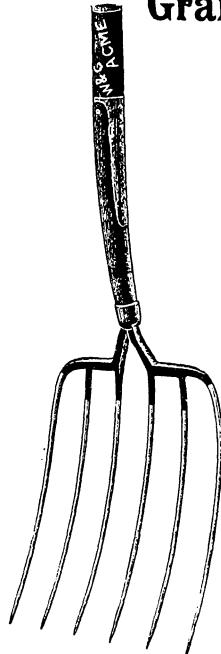
Withington & Cooley Manufacturing Co.,

JACKSON, MICHIGAN, U. S. A.,

MAKERS OF

Forks, Hoes, Garden Rakes, Potato Hooks, Scythe Snaths,
Grain Cradles, Handles, Wheelbarrows, &c.

SPECIALTIES.



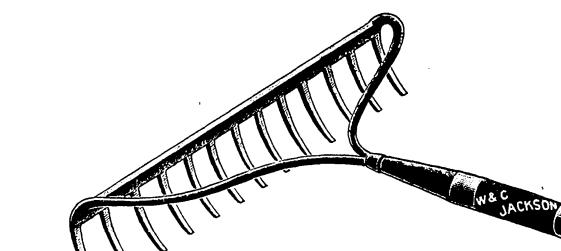
ACME MANURE.



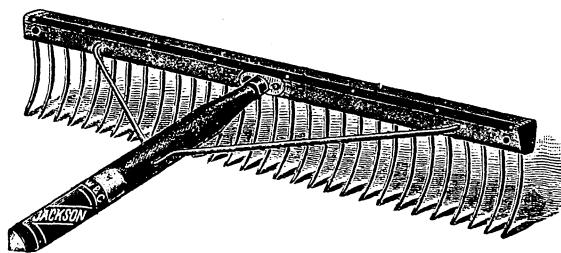
WARREN.



ACME WEEDEER.



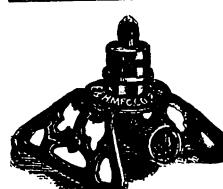
BOW RAKE.



JACKSON LAWN RAKE.



GRASS SNATH.

Japanese No. 12.
Adjust.

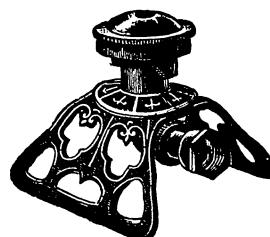
LAWN SPRINKLERS.

We manufacture the **BEST** and
CHEAPEST Lawn Sprinklers in
the World.



Cactus No. 9.

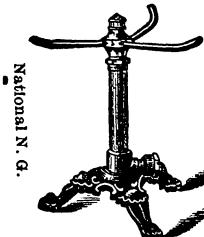
The only Sprinklers which have no revolving parts to leak or wear out.
The only Sprinklers free from small holes, and which cannot become clogged with gritty substances.
The only Sprinklers which are adjustable and will give a spray as fine as the mist of Niagara, or as heavy as
the area of the supply pipe.
The best Sprinklers for high pressures, and the only sprinklers which will give satisfaction with low pressures
We also manufacture the old style revolving sprinklers, but for our own use would not have them



Cactus No. 5.

Ette & Henger Mfg. Co.

ST. LOUIS, MO.



National No. 1.

SEND FOR DESCRIPTIVE CIRCULARS.

DON'T

Lay in your stock of

Lawn Mowers

Before you see

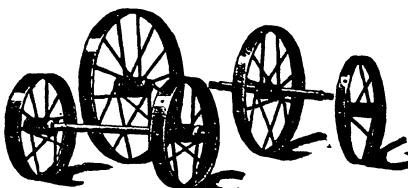
BLAIR MFG. CO.'S

Line for 1895.

List Now Ready. Send for it.

SPRINGFIELD, MASS.

WHEELS. WHEELS. WHEELS.

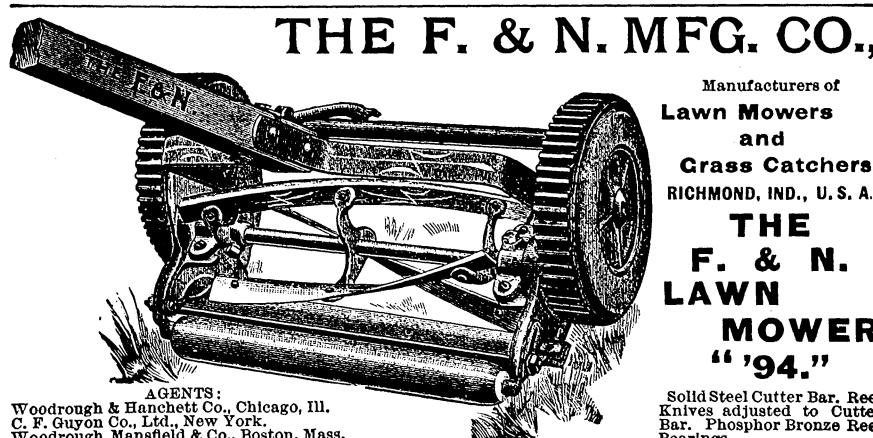


The best there is made for Wheelbarrows and
Trucks. Send for Circular and Prices.

Address

THE Arnold Metal Wheel Co.

Mention *The Iron Age*. New London, Ohio.



AGENTS:
Woodrrough & Hatchett Co., Chicago, Ill.
C. F. Guyon Co., Ltd., New York.
Woodrrough, Mansfield & Co., Boston, Mass.

Manufacturers of
Lawn Mowers
and
Grass Catchers
RICHMOND, IND., U. S. A.,
THE
F. & N.
LAWN
MOWER
"94."

Solid Steel Cutter Bar. Reel
Knives adjusted to Cutter
Bar. Phosphor Bronze Reel
Bearings.



SCRAPERS
AND
WHEEL-
BARROWS.

All styles and sizes at bottom prices. For the dealer, the contractor and user. If looking for the best, we are headquarters.

Sidney Steel Scraper Co.

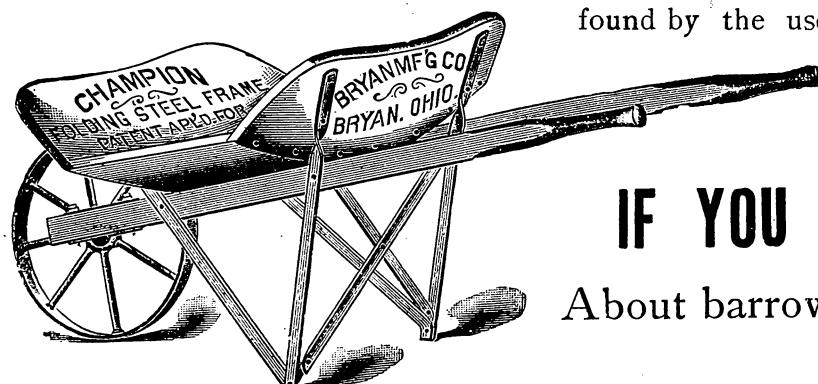


924 Poplar St.,
SIDNEY, OHIO.

Champion Barrows

have been on the market for over 23 years and are known the world over as the best. We make them in all the usual styles both for export and domestic trade. They are constructed of the best material on the most scientific principles and are

found by the user to be the cheapest barrow made considering their durability.



IF YOU ARE THINKING

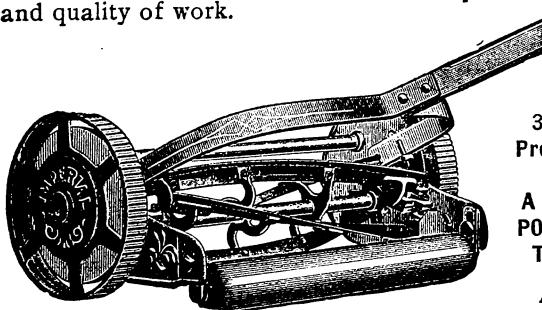
About barrows write us for prices.

**COLDWELL LAWN MOWER CO.,
NEWBURCH, N. Y.**

THE BEST IN THE WORLD.

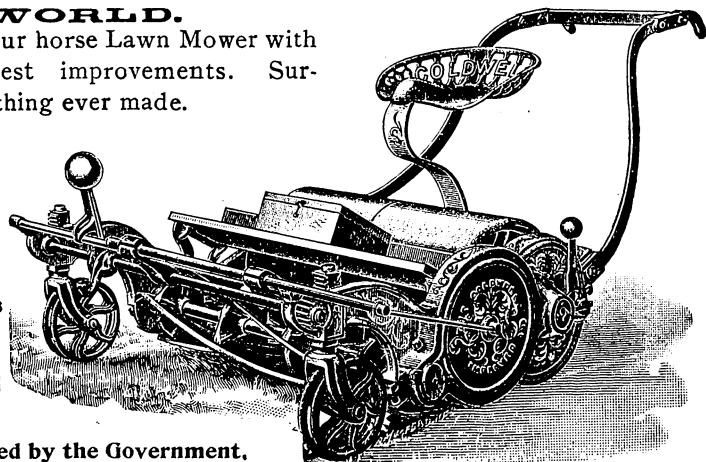
This is our hand mower that was awarded the **Highest Premium** and attracted so much attention at Chicago, for its lightness of draught, durability and quality of work.

This is our horse Lawn Mower with all the latest improvements. Surpasses anything ever made.



3 First
Premiums
NOT
A WEAK
POINT IN
THEM.

Adopted by the Government,



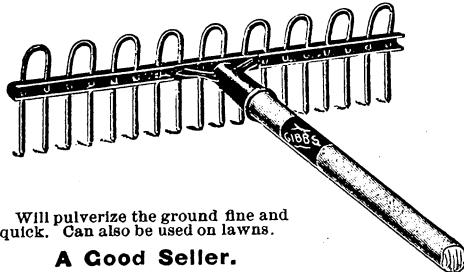
"BOSS" and "IDEAL" GARDEN RAKES. (Pat'd.)

WILL NOT BREAK.

ALL STEEL.

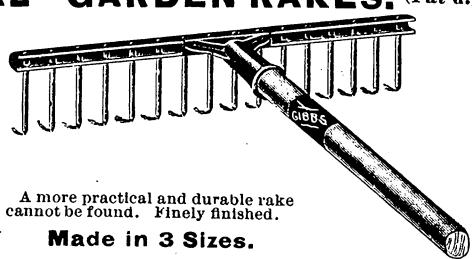
Strong, Heavily Tinned.

LOW IN PRICE.



Will pulverize the ground fine and quick. Can also be used on lawns.

A Good Seller.



A more practical and durable rake cannot be found. Finely finished.

Made in 3 Sizes.

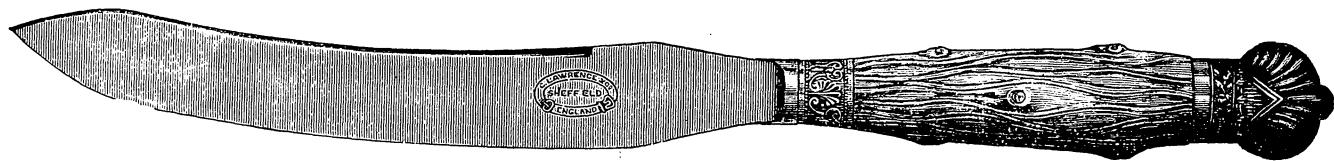
JNO. H. GRAHAM & CO., N. Y. Agents,
113 Chambers St., N. Y.

GIBBS MFG. CO., Canton, Ohio.

THIS IS ONLY ONE

OF OUR MANY DESIRABLE PATTERNS OF FINE

IMPORTED CARVERS.



We have them all styles and prices. It will pay you to examine samples and allow us to quote you.

SUPPLEE HARDWARE CO.,

PHILADELPHIA.

Sole United States Selling Agents for B. WORTH & SON'S Sheffield Celebrated Razors and Butcher Knives.

McGuire's Diamond.

MANUFACTURED BY

**Dille & McGuire Mfg. Co.,
RICHMOND, IND., U. S. A.**

PRICE-LIST.

Wheels, 8 Inches High. Cutter, 5½ Inches Diameter.

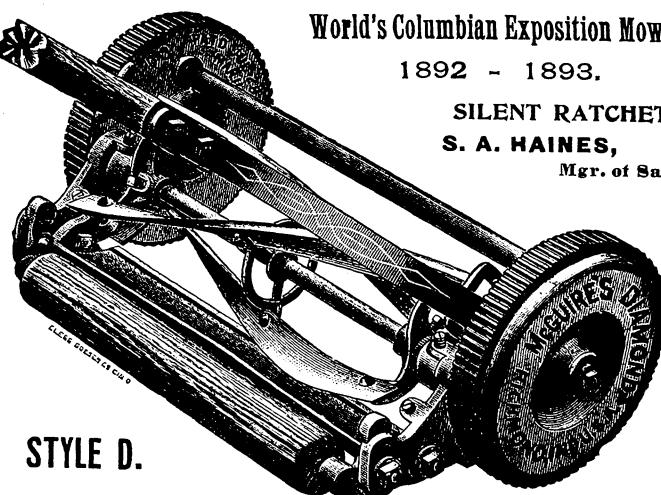
LENGTH.	LIST.	Discount to the
10 Inch	\$13.00	Trade,
12 "	14.00	70 per cent.
14 "	15.00	
16 "	16.00	
18 "	17.00	F. O. B. Factory.

PHOSPHOR BRONZE JOURNAL BEARINGS. BEST QUALITY STEEL.

This is the Mower contracted for by the Chief of Construction at the Columbian Exposition; was used on the lawns at the World's Fair grounds during the preparatory season of 1892, and being approved by the Landscape Architects, was adopted exclusively for 1893.

If you wish a first-class Mower in all respects, one that is fully warranted,

—**BUY McGuire's Diamond.**—



—**OFFICIAL**—
World's Columbian Exposition Mower,
1892 - 1893.

SILENT RATCHET.
S. A. HAINES,
Mgr. of Sales.

STYLE D.



TROJAN No. 2.

The "Trojan" No. 2 is an all bolted barrow; has sawed staves bent so as to make a perfect fit. Well seasoned and will not split in wet or dry climate. Furnished either with wood or iron wheel.

G. W. THOMAS & CO.,

Toledo, O.

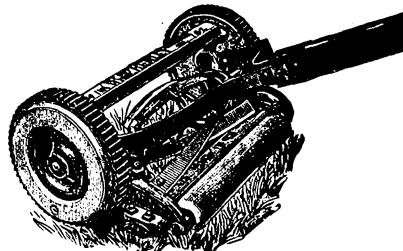
HENLEY'S MOWERS

For Lawns and Parks

Are first class, high grade machines, made of the best materials, neat, symmetrical, strong and unexcelled in construction and ease of operation. Does perfect work. For prices, address

M. C. HENLEY, Sole Mfr., Richmond, Ind., U. S. A.

EASTERN REPRESENTATIVES: H. S. Earle, 110 and 112 N. Warren St., Syracuse, N. Y.; Wm. H. Cole & Sons, 18 S. Charles St., Baltimore, Md.; Carpenter & Bayles, 91 Chambers St., New York City.

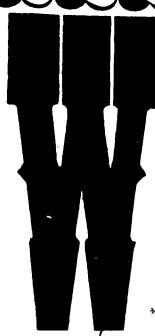


**Chadborn & Coldwell
Mfg. Co.,**

NEWBURGH, N. Y.,
—Sole Manufacturers of—

New Model
AND
Excelsior
LAWN
MOWERS
Also
The Rival,
The O K,
Etc., Etc.

Send for Illustrated Catalogue.



WROUGHT

True
to
Guage

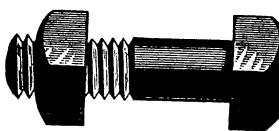
WASHERS

Made from specially rolled plate by our own patented machinery.
Every washer flat, with hole in true center. Sold in 200 lb. kegs, or 1 and 5 lb. paper boxes.

Get prices.

THE MILTON MANUFACTURING CO., MILTON, PA.

HIGH GRADE

Machine
BoltsHot pressed
Nuts

Stamped to size. Guaranteed extra quality.
Send for catalogue.

Pennsylvania Bolt & Nut Co. Lebanon, Pa.

MANUFACTURERS OF

REFINED BAR-IRON · MACHINE-BOLTS · TRACK-BOLTS & BOLT-ENDS ·
LAG-SCREWS · GIMLET-POINTED COACH-SCREWS · HOT PRESSED & COLD PUNCHED SQUARE & HEXAGON NUTS ·
CHAMFERED & TRIMMED NUTS · WROUGHT & CAST WASHERS · TURN-BUCKLES ·
STRUCTURAL & ELECTRICAL FORGINGS · BOILER & BRIDGE RIVETS · CAR FORGINGS & ARCH-BARS

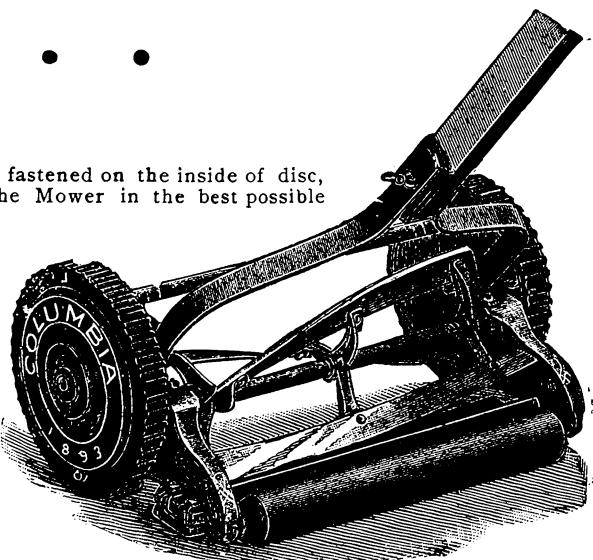
COLUMBIA. . . .

The connecting bar of this Mower is a $\frac{5}{8}$ cold drawn steel shaft, fastened on the inside of disc, with tempered steel set screws; this, with a cutter bar fastened into the Mower in the best possible way, makes it strong and rigid.

The reel runs in long polished brass boxes, adjusted by single screw at each end. The best tempered steel is used, and bearings are adjustable, compensating for all wear. The best malleable iron is used in the roller arms and reel spiders.

Instead of a ratchet, we use a clutch that is positively noiseless, on which there is no wear, as it is either fully engaged or entirely out of the way; the clutch is engaged by the forward motion of the drivers only—no springs or extra pieces to wear out or get lost.

A Floating Handle is quickly adjusted for a child or tall person or for cutting down a terrace, simply by a thumb-nut acting on a notched clamp on the handle and handle irons.



WRITE FOR DISCOUNTS TO

F. S. Anderson & Co., Richmond, Ind.

CYCLONE CORN SHELLER.
Will Shell a Bushel
of Corn
in 4 Minutes.



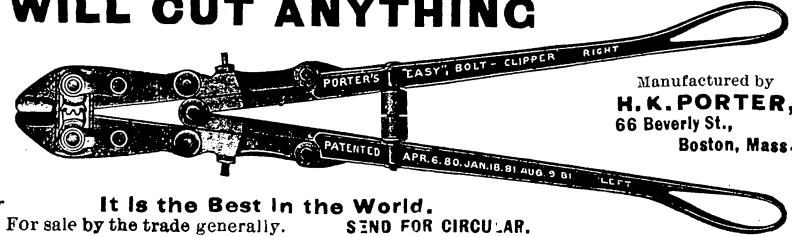
Sample Sheller
\$3.00.
AGENTS
WANTED.

Ask your
Merchant
for it
Send for
circular.

**BEST
SHELLER**
in the world.
All Machines
Warranted.

GARRY IRON ROOFING CO., Sole Manufacturers
and Owners, Cleveland, O., U. S. A. Mention Iron Age.

THE "EASY" BOLT CLIPPER.
WILL CUT ANYTHING



Manufactured by
H. K. PORTER,
66 Beverly St.,
Boston, Mass.

23,000 Sold.

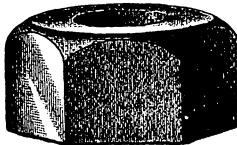
It is the Best in the World.
SEND FOR CIRCULAR.

Port Chester Bolt & Nut Co.,

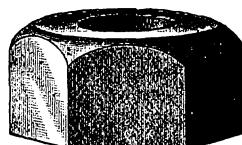
PORT CHESTER, N. Y.

MANUFACTURERS OF

Cold Punched, Chamfered and Trimmed, Case-Hardened
and Semi-Finished



NUTS.



NUTS FOR RAILROADS, CAR BUILDERS', LOCOMOTIVE BUILDERS' AND MACHINISTS'
USE A SPECIALTY.

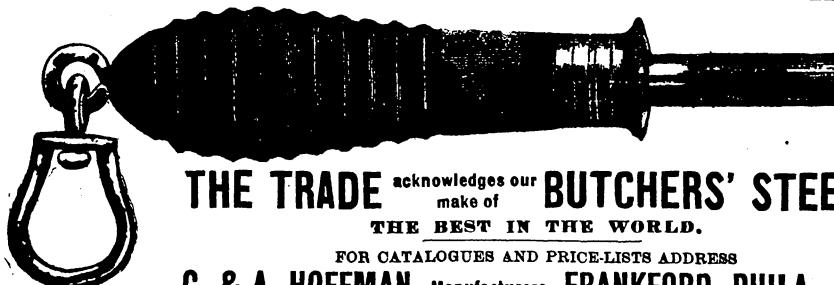
CORRESPONDENCE SOLICITED.

ESTABLISHED 1865.

J. H. Sternbergh & Son, READING,
PENNA.

Bolts, Nuts, Washers, Rivets.

Send for our New Catalogue and
Discounts.



THE TRADE acknowledges our
make of BUTCHERS' STEELS
THE BEST IN THE WORLD.

FOR CATALOGUES AND PRICE-LISTS ADDRESS

C. & A. HOFFMAN, Manufacturers, FRANKFORD, PHILA., PA.

The New Britain Hardware Mfg. Co.

New Britain, Conn., U. S. A.

MAKERS OF ALL KINDS OF

Special Machine Screws, Studs, Bolts, &c.

BICYCLE PARTS,
SPECIAL HARDWARE.

Pattern Makers' Dowels and Emery Wheel Dressers
Electro, Brass and Nickel Plating.

CALF WEAVER "Shaw's Pat."

MADE BY

Carroll Muzzle Co.

CARROLL, IA.

No wounds.

No fretting.

Put Weavers on Calves and turn them
out with the cows.

"It is the only machine I ever had that worked per-
fectly in every way."

A. R. ANDERSON, County Supervisor.

THE TECHNO-CHEMICAL RECEIPT BOOK.

CONTAINING

SEVERAL THOUSAND RECEIPTS, COVERING THE LATEST
MOST IMPORTANT AND MOST USEFUL DISCOVERIES IN
CHEMICAL TECHNOLOGY, AND THEIR PRACTICAL
APPLICATION IN THE ARTS
AND THE INDUSTRIES.

Edited from the German with Additions by

WILLIAM T. BRANNET.

495 Pages, Cloth, \$2.00.

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Read St., New York.

DUNHAM NUT CO.,

UNIONVILLE, CONN.

Manufacturers of

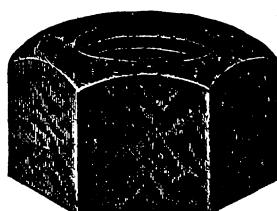
All Grades

of

Finished

Nuts

and



Automatic Cold Press Nut Machines.

SEND FOR CATALOGUE.

EXPANSION BOLTS.



Manufacturers of Single and Double,
For fastening all kinds of Structure to Brick and Stone
Work. Catalogue furnished on application.

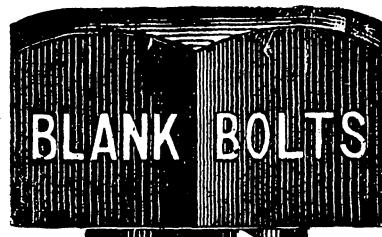
STEWARD & ROMAINE M^CG. CO., - Philadelphia.

HARVEY HUBBELL,
Machinery and Tools Mfr.
SCREWS
Machine Screws for electrical pur-
poses. Sample box free. Send for cir-
cular.

BRIDGEPORT, CONN.

M

LAG SCREWS



BLANK BOLTS

AMERICAN BOLT CO.
MANUFACTURERS
LOWELL MASS.

COTTON AND WOOLEN MILLS AND MACHINERY MANUFACTURERS.



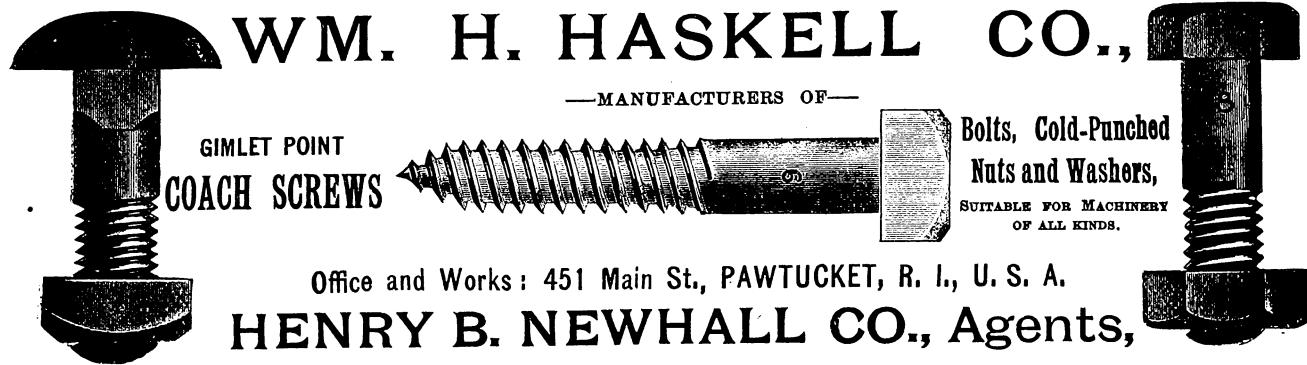
COLD SQUARE AND
PUNCHED HEXAGON NUTS
OF ALL KINDS

BOLTS OF ALL KINDS FOR RAILROADS, BRIDGE BUILDERS,

WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

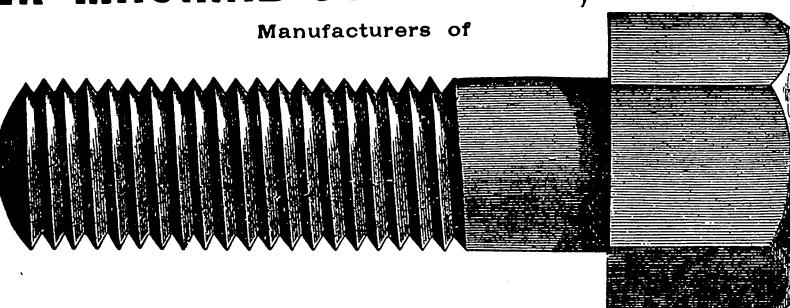
D. A. HUNT, AGENT.



WORCESTER MACHINE SCREW CO., Worcester, Mass.

SET,
CAP AND
MACHINE
SCREWS.

Manufacturers of



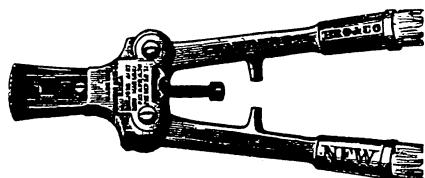
STUDS FOR
STEAM
ENGINE,
PUMPS, &c.

EXPANSION BOLTS.



For Fastening all Kinds of Structure to
Brick and Stone Work.

Patentee and M'fr, ISAAC CHURCH,
Send for Catalogue. 1521 Walnut St., TOLEDO, O.



BOLT & RIVET CLIPPERS,

For cutting off the ends of Bolts and Rivets.
Liberal discounts to the trade.

CHAMBERS BROTHERS COMPANY

52d St., BELOW LANCASTER AVE.,
PHILADELPHIA, PA.



WM. H. JACOBUS,

No. 90 Chambers St., New York.

New York Office of

J. F. Wollensak.
Barnes Mfg. Co.
N. R. Streeter & Co.
Geo. W. Nock.
Tuck Mfg. Co.

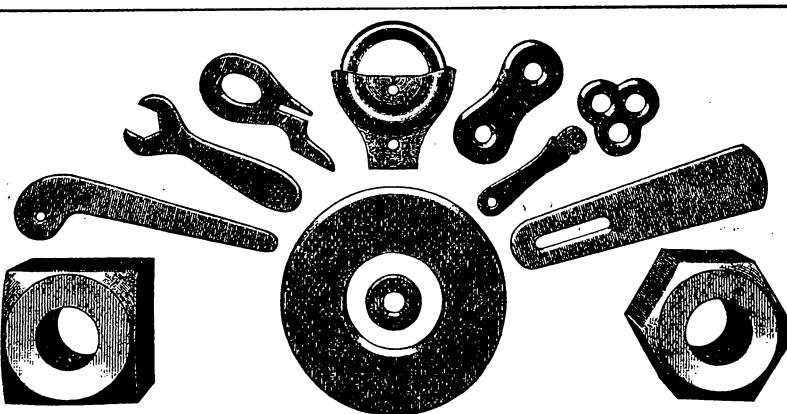
Henis Vegetable Press.
Dille & McGuire Mfg. Co.
Bommer Bros.
Palmer Hdw. Mfg. Co.
Wire Goods Co.

National Rivet Works.
Wolcott Hdw. Co.
Fibre Head Mallet.
Burnside Cedar Faucets.
Cleveland Window Shade Co.

Zimmerman's Blind Adjusters.
Garrett & Beach.
Wilcox Mfg. Co.
M. B. Schenck & Co.
Hemacite Mfg. Co.

Franklin Mfg. Co.
Atlas Mfg. Co.
National Specialty Mfg. Co., Ltd.

Cold Punched Nuts and



Washers for all Purposes.

J. FRED WILSON, Worcester, Mass.

Metal Punching and Die Work.

Send for prices on Specialties in line of Press Work.

CLASSIFIED LIST OF ADVERTISERS.

Advertising.

Maule, Francis L., Philadelphia, Pa.

Agricultural Implements.

Iowa Farming Tool Co., Ft. Madison, Iowa.
Sickles, Sweet & Lyon, 35 Barclay St., N. Y.
Withington & Cooley Mfg. Co., Jackson, Mich.

Air Compressors.

Norwalk Iron Works, S. Norwalk.

Air Moving Machinery.

Howard & Morse, 45 Fulton, N. Y.

Aluminum.

Illinois Pure Aluminum Co., Lemont, Ill.
Pittsburgh Reduction Co., Pittsburgh.
Scovill Mfg. Co., Waterbury, Conn.
Wohler Aluminum Co., Chicago, Ill.

Aluminum, Brass and Bronze.

Gaylor, F. L. Co., Ansonia, Conn.
Haight & Clark, Albany, N. Y.
Pratt & Cady Co., Hartford, Conn.

Analytical Chemists.

Brittton, J. Blodgett, Philadelphia, Pa.

Anti-Friction Metals.

—See Babbitt Metal.

Anvil and Vise (Combination).

Fulton Iron & Engine Works, Detroit, Mich.

Apple Parers.

Goodell Co., Antrim, N. H.

Arms and Ammunition.

Chicago Fire Arms Co., Chicago, Ill.
Harrington & Richardson Arms Co., Worcester, Mass.
Hartley & Graham, 313 & 315 Broadway, New York.
Ideal Mfg. Co., New Haven, Conn.
Lovell, Jno. P. Arms Co., Boston, Mass.
Stevens, J. Arms and Tool Co., Chicopee Falls, Mass.
Union Metallic Cartridge Co., 313 & 315 Broadway, N. Y.

Attorney at Law.

Coleman, J. A., Chicago, Ill.

Auctioneers.

Bissell, E. Son & Co., N. Y.

Auger Bits.

Bridgeport Gun Implement Co., 313-315 Broadway, New York.

Augers and Bits.

Syracuse Twist Drill Co., Syracuse, N. Y.

Axes.

Amer. Axe & Tool Co., 280 B'way, N. Y.
Carter & Co., Scranton, Pa.

Peck, A. G. & Co., Cohoes, N. Y.

Axe Wedges.

Sawyer Hdw. & Supply Co., Pawtucket, R. I.
Thomas, W. H., Jenkintown, Pa.

Axes, Springs, &c., Manuf's of.

Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Wurster, F. W. & Co., Brooklyn, N. Y.

Babbitt Metal.

Bridgeport Deoxidized Bronze and Metal Co., Bridgeport, Conn.
Crown Smelting Co., Chester, Pa.
Hertz, T. & Son, St. Louis, Mo.

Keys, W. W. & R. M. Co., Bridgeport, Conn.

Reeves, Paul S., Philadelphia, Pa.
Syracuse Smelting Works, Syracuse, N. Y.

Bakers and Roasters.

Bronson Supply Co., Cleveland, Ohio.

Bale Ties.

Kilmer Mfg. Co., Newburg, N. Y.

Barb Wire and Fence.

Cincinnati Barb Wire Fence Co., Cincinnati, O.
Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Indiana Wire Fence Co., Crawfordsville, Ind.

Kilmer Mfg. Co., Newburg, N. Y.

Ludlow-Saylor Wire Co., St. Louis, Mo.

Washburn & Moen Mfg. Co., Worcester.

Bar Iron, Manufacturers of.

Etna Standard Iron & Steel Co., Bridgeport, Ohio.

Allentown Rolling Mill, Allentown, Pa.

Burden Iron Co., Troy, N. Y.

Crescent Horse Shoe & Iron Co., Max Meadows, Va.

Montour Iron & Steel Co., Danville, Pa.

Mahoning Valley Iron Co., Youngstown, Ohio.

Sternbergh, J. H. & Son, Reading, Pa.

Barrel Openers.

Am. Specialty Co., Hartford, Conn.

Bellows, Manufacturers of.

Scott, Geo. M., Chicago, Ill.

Bells.

Bevin Bros. Mfg. Co., East Hampton.

Belt Dressing.

Jos. Dixon Crucible Co., Jersey City, N. J.

Belt Fasteners.

Bristol Co., Waterbury, Conn.

Claffen Mfg. Co., Cleveland, Ohio.

Sawyer Hdw. & Supply Co., Pawtucket, R. I.

Talcott, W. O., Providence, R. I.

Beltting, Makers of.

Alexander Bros., 412 N. 3d, Phila.

Jeffrey Mfg. Co., Columbus, O.

Link-Belt Engineering Co., Phila., Pa.

Main Belting Co., Philadelphia, Pa.

N. Y. Belting & Packing Co., Ltd., N. Y.

Roberts Mfg. Co., Pittsburgh, Pa.

Shultz Belting Co., St. Louis, Mo.

Bicycles.

Crawford Mfg. Co., Hagerstown, Md.
Eagle Bicycle Mfg. Co., Torrington, Ct.
Grand Rapids Cycle Co., Grand Rapids, Mich.
League Cycle Co., Hartford, Conn.
Lovel, Jno. P. Arms Co., Boston, Mass.
Monarch Cycle Co., Chicago, Ills.
Pope Mfg. Co., Boston, Mass.

Bicycle Parts.

New Britain Hdw. Mfg. Co., New Britain, Conn.

Bicycle Spokes.

Excelsior Needle Co., Torrington, Ct.

Bicycle Sundries.

Devon Bros. Mfg. Co., E. Hampton, Mass.

Bit Braces.

Almond Tool Corp., Buffalo, N. Y.

Bits and Braces.

Fray, Jno. S. & Co., Bridgeport, Conn.

Blocks, Tackle, Makers of.

Cleveland Block Co., Cleveland, O.
Fulton Iron & Engine Works, Detroit, Mich.

Union Hardware Co., Torrington Ct.

Blowers.

Buffalo Forge Co., Buffalo, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Huyett & Smith Mfg. Co., Detroit, Mich.

Sturtevant, B. F. & Co., Boston, Mass.

Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.

McIlvain, Wm. & Sons, Reading, Pa.

Lukens Iron & Steel Co., Coatesville, Pa.

Pottstown Iron Co., Pottstown, Pa.

Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

Boilers, Steam.

Babcock & Wilcox Co., 30 Cortlandt, Chandler & Taylor Co., Indianapolis, Ind.

Harrison Safety Boiler Wks., Phila., Pa.

Pollock, W. B. & Co., Youngstown, O.

Porter, H. K., Boston, Mass.

Southward Fdy. & Mch. Co., Phila., Pa.

Sterling Co., Chicago, Ill.

Wetherill, Robt. & Co., Chester, Pa.

Bolt Cutters.

Chamber Bros. Co., Philadelphia.

Howard Iron Works, Buffalo, N. Y.

Porter, H. K., Boston, Mass.

Wells Bros. & Co., Greenfield, Mass.

Books.

American Press, 14 Lafayette Place, N. Y.

Williams, David, 96-102 Reade, N. Y.

Boring Machines.

Buckeye Mfg. Co., Union City, Ind.

Box Banders.

Goodell, J. W., Burlington, Vt.

Box Straps and Corners.

Cary Mfg. Co., 5 to 9 Elm St., N. Y.

Boxes, Hdw. Shelf, &c.

Green, A. H., 22 Park Place, N. Y.

Jones, Jess & Co., Philadelphia, Pa.

Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.

Davol, John & Sons, 100 John, N. Y.

Plume & Atwood Mfg. Co., N. Y.

Randolph & Clowes, Waterbury, Conn.

Rome Brass & Copper Co., Rome, N. Y.

Scovill Mfg. Co., Waterbury, Conn.

Waterbury Brass Co., 296 B'way, N. Y.

Braas Butt Hinges.

Tiebout, W. & J., 18 & 18 Chambers.

Brass Foundries.

Cramp, Wm. & Sons S. & E. B. Co., Philadelphia, Pa.

Eynons-Evans Mfg. Co., Philadelphia, Pa.

Brass Goods Mfg. Co.

88 Chambers.

Bread and Cake Knives.

Cincinnatti Mfg. Co., Cincinnati, O.

Clauss Shear Co., Fremont, O.

Bronze (Tobin).

Ansonia Bronze & Copper Co., 19-21

Citit Street, N. Y.

Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.

Russell & Erwin Mfg. Co., New York

South, W. A. Co., Salem, Mass.

Taylor & Towne Mfg. Co., Stamford, Ct.

Burr Wheels.

Torrance Iron Co., Troy, N. Y.

Butchers' Steels.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.

Hoffman, C. & A., Philadelphia, Pa.

Nichols Bros., Greenfield, Mass.

Butcher and Shoe Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.

Goodell Co., Antrim, N. H.

Nichols Bros., Greenfield, Mass.

Wilson, John, Sheffield, England.

Butts and Hinges.

Clark Mfg. Co., Buffalo, N. Y.

McKinney Mfg. Co., Allegheny, Pa.

Sabin Machine Co., Montpelier, Vt.

Stanley Works, New Britain, Conn.
Tiebout, W. & J., 16 Chambers, N. Y.

Wrightsville Hdw. Co., Wrightsville, Pa.

Cabinet Benches.

Grand Rapids Hand Screw Co., Grand

Rapids, Mich.

Calf Werners.

Carroll Muzzle Co., Carroll, Ia.

Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee

Falls, Mass.

Starrett, L. S., Athol, Mass.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Wolf, W. & L., Philadelphia, Pa.

Carriage Hardware, Makers of.

Clapp, E. D. Mfg. Co., Auburn, N. Y.

Cover's Saddlery Works, Palmer, N. Y.

Eccles, Richard, Auburn, N. Y.

Scranton Forging Co., Scranton, Pa.

Smith, H. D. & Co., Plantsville, Conn.

Wilcox & Howe, Birmingham, Conn.

Wicks, H. & Co., New Haven, Conn.

Egg Beaters.
North Bros. Mfg. Co., Philadelphia, Pa.

Electric Bells and Supplies.
Ostrander, W. R. & Co., 204 Fulton St., New York.

Wolensak, J. F., Chicago, Ill.

Electric Dynam. Machines.
Hanson & Van Winkle Co., Newark, N.J.

Electric Lights.
Electric Construction & Supply Co., 18 Cortlandt St., N. Y.

Elevators, Makers of.
Link-Belt Engineering Co., Phila., Pa.

Morse, Williams & Co., Phila., Pa.

Penna. Elevator Engineering Co., Phila., Pa.

Variety Machine Co., Warsaw, N. Y.

Warner Elevator Mfg. Co., Cincinnati, Ohio.

Emery and Emery Wheels.
Cutter, Wood & Stevens, Boston, Mass.

Diamond Mach. Co., Providence, R. I.

N. Y. Belting & Packing Co., Ltd., N. Y.

Northampton Emery Wheel Co., Worcester, Mass.

Norton Emery Wheel Co., Worcester, Mass.

Sterling Emery Wheel Co., 174 Fulton St., N. Y.

Tanite Co., Stroudsburg, Pa.

Emery Wheel Dressers.
Bay State Stamping Co., Worcester, Mass.

Engineers and Contractors.
Aiken, Henry, Pittsburgh, Pa.

Herrick, J. A., 284 Pearl St., N. Y.

Kennedy, Julian, Pittsburgh, Pa.

Loughlin, Alex. & Co., Pittsburgh, Pa.

Lean, D. R., Co., Pittsburgh, Pa.

McClure, Amsler & Co., Pittsburgh, Pa.

Smythe, R. Co., Incorporated, Pittsburgh, Pa.

Swindell, W. & Bros., Pittsburgh, Pa.

Engines, Gas and Gasoline.
Buckeye Mfg. Co., Union City, Ind.

Otto Gas Engine Works, Phila., Pa.

Springfield Gas Engine Co., Springfield, Ohio.

Engines, Steam, Makers of.
Allis, E. P. Co., Milwaukee, Wis.

Bass Foundry & Machine Works, Ft. Wayne, Ind.

Chandler & Taylor Co., Indianapolis, Ind.

Harris, Wm. A., Steam Engine Co., Providence, R. I.

Lane & Bodley Co., Cincinnati, Ohio.

Norwalk Iron Works Co., So. Norwalk Conn.

Phila. Engineering Works, Phila., Pa.

Southwark Foundry & Machine Co., Phila., Pa.

Tod, William & Co., Youngstown, O.

Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.

Westwick, Jno. & Son, Galena, Ill.

Wetherill, Robt. & Co., Chester, Pa.

Exerciser.
Independent Electric Co., Chicago, Ill.

Expansion Bolts.
Boone, W. C. Mfg. Co., Boonton, N. J.

Church, Isaac, Toledo, O.

Steward & Romaine Mfg. Co., Phila., Pa.

Exporters.
Flint Co., 68 Broad St., N. Y.

Faucets, Self-Measuring.
Lane Bros., Poughkeepsie, N. Y.

Faucets, Wooden, Makers of.
John Summer's Son, Newark, N. J.

Feed-Water Heaters and Purifiers.
Davis, I. B. & Son, Hartford, Conn.

Harrison Safety Boiler Works, Phila., Pa.

National Pipe Bending Co., New Haven, Conn.

Taunton Locomotive Mfg. Co., Taunton, Mass.

Webster, Warren & Co., Camden, N. J.

Whitlock Coll Pipe Co., Elmwood, Conn.

Fence Ratchets.
Wire Fence Supply Co., Indianapolis, Ind.

Fencing, Iron and Wire.
Barnum, E. T., Detroit, Mich.

Champion Iron Co., Kenton, O.

Chees Bros., Pittsburgh, Pa.

Clinton Wire Cloth Co., Clinton, Mass.

Gilbert & Bennett, Mfg. Co., 42 Cliff St.

Kilmer Mfg. Co., Newburgh, N. Y.

McCallip Fence & Wire Wks., Columbus, Ohio.

The Van Dorn Iron Works Co., Cleveland, O.

Wire Fence Supply Co., Indianapolis, Ind.

Files, Importers of.
Moss, F. W., 80 John St., N. Y.

Files and Rasps, Manufacturers of.
Arcade File Works, Anderson, Ind.

Banker & White, Troy, N. Y.

Barnett, G. & H., 41 & 43 Richmond, Phila.

McCaffrey File Co., Philadelphia.

Nicholson File Co., Providence, R. I.

Fire Brick, Makers of.
Borgner, Cyrus, Philadelphia, Pa.

Gardner, Jas. & Son, Cumberland, Md.

Kreisler, B. & Sons, foot E. Houston St., N. Y.

Maurer, H. & Son, 420 E. 23d, N. Y.

Ostrander Fire Brick Co., Troy, N. Y.

Valentine, M. D. & Bro. Co., Woodbridge.

Fire Doors.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

Fishing Tackle.
Dame, Stoddard & Kendall, Boston, Mass.

Flint and Emery Paper.
Baader, Adamson & Co., Phila., Pa.

Flour Sifters.
Meyers, Fred, J. Mfg. Co., Hamilton, O.

Fodder Cutters.
Silver Mfg. Co., Salem, O.

Forges, Portable, &c.
Buffalo Forge Co., Buffalo, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Sturtevant, B. F. Co., Boston, Mass.

Forgings, Iron and Steel.
Bethlehem Iron Co., S. Bethlehem, Pa.

Cambria Steel—Cambria Iron Co., Johnstown, Pa.

Frankford Steel Co., Phila., Pa.

Scranton Forging Co., Scranton, Pa.

U. S. Projectile Co., Brooklyn, N. Y.

Forks, Hay and Manure.
Iowa Farming Tool Co., Ft. Madison Iowa

Withington & Cooley Mfg. Co., Jackson, Mich.

Foundry Facings.
Dixon, Jos., Crucible Co., Jersey City, N. J.

S. Obermayer Co., Cincinnati, O.

Smith's Patter Works, Akron, Ohio.

Foundry Riddles.
Estey, W. S., 65 Fulton, N. Y.

Foundry Supplies.
S. Obermayer Co., Cincinnati, O.

Rice Mfg. Co., New Durham, N. H.

Smith, J. D., Fdy. Supply Co., Cinn., O.

Smith's Patter Works, Akron, Ohio.

Friction Clutches.
Brown, A. & F., 17 Dey St., N. Y.

Keystone Clutch & Mch. Wks., Phila., Pa.

Moore & White Co., Philadelphia, Pa.

Galvanized Material.
Jersey City Galvanizing Co., 112 John St., N. Y.

Galvanizing and Tinning.
Wilcox, Crittenden & Co., Middletown, Conn.

Gas Producers.
Wood, R. D. & Co., Philadelphia, Pa.

Gas Stoves.
Boligiano Mfg. Co., Baltimore, Md.

Gas & Steam Fitters' Supplies.
Leavitt Mch. Co., Orange, Mass.

Panocast, Henry B. & Co., Phila., Pa.

Gate Hinges.
Wrightsville Hdw. Co., Wrightsville, Pa.

Gear Cutters.
D. E. Whilton Mach. Co., New London, Conn.

Gears.
Boston Gear Works, Boston, Mass.

Gleason Tool Co., Rochester, N. Y.

Lincoln Iron Works, Rutland, Vt.

Poole, Robt. & Son Co., Baltimore, Md.

U. S. Projectile Co., Brooklyn, N. Y.

Glass Boards.
Lufkin Rule Co., Saginaw, Mich.

Glass Cutters.
Monce, S. G., Bristol, Conn.

Glaziers' Points.
Shelton Co., Birmingham, Conn.

Glue.
Baeder, Adamson & Co., Phila., Pa.

Dodd, A. W. & Co., Gloucester, Mass.

Russia Cement Co., Gloucester, Mass.

Grate Guards.
Dow Wire Works Co., Louisville, Ky.

Grinding and Polishing Machines.
Appleton Mfg. Co., Phila., Pa.

Cutter, Wood & Stevens, Boston, Mass.

Diamond Mach. Co., Providence, R. I.

Herrick & Cowell, New Haven, Conn.

Norton Emery Wheel Co., Worcester, Mass.

Grindstone Dressing Machinery
Blake & Johnson, Waterbury, Conn.

Grindstones.
Cleveland Stove Co., Cleveland, O.

Gun Implements.
Bridgeport Gun Implement Co., 313-315 Broadway, N. Y.

Union Hdw. Co., Torrington, Conn.

Gunpowder, Makers of.
Laflin & Rand Powder Co., 29 Murray St., N. Y.

Gymnasium Supplies.
Independent Electric Co., Chicago, Ill.

Hair Curlers.
Trixie Hair Curler Co., Cincinnati, O.

Handles.
Cleveland Wood Turning Co., Cleveland, O.

Piqua Handle & Mfg. Co., Piqua, Ohio.

Hangers, Door.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

Graham, John H. & Co., 113 Chambers Street, N. Y.

Lane Bros., Poughkeepsie, N. Y.

Hardware Comm'n Merchants.
Graham, John H. & Co., 111 Chambers St., New York.

Jacobus, W. H., 90 Chambers, N. Y.

Hardware Drawers.
Wernicke Co., Minneapolis, Minn.

Hardware Jobbers.
White, Van Glahn & Co., 15-17 Chat-ham Square, N. Y.

Hardware Manufacturers.
Allentown Hardware Works, Allentown, Pa.

Miller Falls Co., 93 Reade St., N. Y.

Russell & Erwin Mfg. Co., Chambers St., New York.

Stearns, E. C. & Co., Syracuse, N. Y.

Streeter, N. R. & Co., Groton, N. Y.

Supplee Hdw. Co., Phila., Pa.

Union Mfg. Co., 103 Chambers, N. Y.

Yale & Towne Mfg. Co., Stamford Conn.

Hardware Mfrs. Agents.
Bingham, W. Co., Cleveland, O.

Clarke, Thomas, St. John, N. B.

Graham, John H. & Co., 113 Chambers, N. Y.

Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Hardware Specialties.
Acme Shear Co., Bridgeport, Conn.

Berger Bros., Philadelphia, Pa.

Clark Mfg. Co., Buffalo, N. Y.

Enterprise Mfg. Co., Philadelphia, Pa.

Ette & Hener Mfg. Co., St. Louis, Mo.

Gwinner Mfg. Co., Hamilton, O.

Johnson, S. C., Racine, Wis.

New Britain Hdw. Mfg. Co., New Britain, Conn.

North Bros. Mfg. Co., Philadelphia, Pa.

Ranson Hdw. Co., Burlington, Vt.

Scranton & Co., New Haven, Conn.

Shepard, Sidney Co., Buffalo, N. Y.

Union Lock & Hdw. Co., Lancaster, Pa.

Wilson, J. Fred., Worcester, Mass.

Wrightsville Hdw. Co., Wrightsville, Pa.

Harness Snaps.
Cover Mfg. Co., West Troy, N. Y.

Coverts' Saddlery Wks., Farmer, N. Y.

Fitch, W. & E. T., New Haven, Conn.

Hay Tools.
Myers, F. E. & Bro., Ashland, O.

Hoes.
Iowa Farming Tool Co., Ft. Madison, Iowa.

Withington & Cooley Mfg. Co., Jackson, Mich.

Hoisting Machines.
Box, Alfred & Co., 314 Green, Phila.

Brown Hoisting & Conveying Mch. Co., Cleveland, Ohio.

Byers, Jno. F. Mch. Co., Ravenna, O.

Fulton Iron & Engine Wks., Detroit, Mich.

Harrington, E., Son & Co., Phila.

Lake Bros., Poughkeepsie, N. Y.

Lidgerwood Mfg. Co., 96 Liberty, N. Y.

Lincoln Iron Works, Rutland, Vt.

McCoy, Jos. F. & Co., 24 Warren St.

Maris & Beekley, Philadelphia.

Moore Mfg. & Fdy. Co., Milwaukee, Wis.

Morse, Williams & Co., Phila.

Sellers, Wm. & Co., Phila. and N. Y.

Spedel, J. G., Reading, Pa.

Yale & Towne Mfg. Co., Stamford, Ct.

Hollow Ware.
Avery Stamping Co., Cleveland, O.

Bronson Supply Co., Cleveland, Ohio.

Cleveland Stamping & Tool Co., Cleveland, O.

Hollow Ware, Aluminum.
Wohler Aluminum Co., Chicago, Ill.

Shepard, Sidney & Co., Buffalo, N. Y.

Horse Clippers.
Gillette Clipping Machine Co., 201 E. 23d st., N. Y.

Horse Nails, Makers of.
Capewell Horse Nail Co., Hartford, Conn.

National Horse Nail Co., Vergennes, Vt.

Putnam Nail Co., Neponset, Boston, Mass.

Horse and Mule Shoes, Makers of.
Bryden Horse Shoe Co., Catasauqua, Pa.

Burden Iron Co., Troy, N. Y.

Crescent Horse Shoe & Iron Co., Max Meadows, Va.

Leonard, J., 446 West St., N. Y.

Old Dominion Iron & Nail Works Co., Richmond, Va.

Phoenix Horse Shoe Co., Poughkeepsie, N. Y.

Rhode Island Perkins Horse Shoe Co., Providence.

Shoenerger & Co., Pittsburgh, Pa.

Standard Horse Shoe Co., Boston, Mass.

Hose.
N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

Hydrants, &c.
McLean, John, 296 & 298 Monroe, N. Y.

Hydraulic Forging.
U. S. Projectile Co., Brooklyn, N. Y.

Hydraulic Jacks.
Dudgeon, Richard, 24 Columbia, N. Y.

McCoy, Jos. F. Co., 26 Warren St., N. Y.

Ice Cream Freezers.
White Mountain Freezer Co., Nashua, N. H.

Injectors.
Eynon-Evans Mfg. Co., Philadelphia, Pa.

Jenkins Bros., New York.

Sherwood Mfg. Co., Buffalo, N. Y.

Insurance, Boiler.
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Iron and Steel, Swedish.
Lundberg, Gustaf, Boston, Mass.

Milne, A. & Co., 1 Broadway, N. Y.

Iron Commission Brokers.
Butze, Adolph, St. Louis, Mo.

Corning, Edw. & Co., 29 Broadway, N. Y.

Cotton, Barclay W. & Co., Phila.

Etting, Edw. J., Philadelphia.

Hogan, John L. & Co., Philadelphia, Pa.

Hoffman, J. W. & Co., Philadelphia.

Levis, Henry & Co., Philadelphia.

Keely, Jerome & Co., Philadelphia.

Lea, J. Tatnall & Co., Philadelphia.

Mohr, J. J., 430 Walnut, Philadelphia.

Pilling & Crane, Philadelphia, Pa.

Wister, L. & R. Co., Phila., Pa.

Iron Ore.
Samuel, Frank, Philadelphia, Pa.

Iron, Merchants.
Barns, C. K. & Co., Philadelphia, Pa.

Borden & Loring, 70 West, N. Y.

Busselton & Cudliffe, Philadelphia.

Corning, Edw. & Co., 29 Broadway, N. Y.

Cox, Justice, Jr., Philadelphia.

Cotton, Barclay W. & Co., Phila.

Hoffman, J. W. & Co., Philadelphia.

Leonard, J., 446 West St., N. Y.

Nicolls, Wheeler & Co., Philadelphia.

Ogden & Wallace, 577 to 583 Greenwich St., N. Y.

Pierson & Co., 29 Broadway, N. Y.

Thomson, W. H. & Co., Phila., Pa.

Wallace, Wm. H. & Co., 66 B'way, N. Y.

Whitney, A. R. & Co., 17 B'way, N. Y.

Wilson, E. H. & Co., Philadelphia.

Iron, Importers.
Abbott, Wheelock & Co., N. Y. and Boston.

Lundberg, Gustaf, Boston, Mass.

Iron, Sheet, Manufacturers of.
Cambridge Iron & Steel Co., Cambridge, Ohio.

W. Dewees Wood Co., Lim., McKeesport, Pa.

Ironwork, Ornamental.
Barnum, E. T., Detroit, Mich.

Champion Iron Co., Kenton, O.

Ludlow-Saylor Wire Co., St. Louis, Mo.

The Van Dorn Iron Works Co., Cleveland, O.

Japanning.
Smith, Theo. V., 54 John St., N. Y.

Keys.
Wolensak, J. F., Chicago, Ill.

Knife and Tool Grinders.
Tracy, A. J. Co., Ltd., 18 Cliff St., N. Y.

Ladies.
Whiting Fdy. Equipment Co., Chicago, Ill.

Lanterns.
Buh Stamping Co., Detroit, Mich.

Steam Gauge & Lantern Co., Syracuse, N. Y.

Lasts.
Kupferle, Jno. C., St. Louis, Mo.

Lathes.
Beaman & Smith, Providence, R. I.

Dietz, Schumacher & Co., Cincinnati, O.

Draper Machine Tool Co., Worcester, Mass.

Harrington, E. Son & Co., Phila., Pa.

Johnson, Israel H., Jr., & Co., Philadelphia, Pa.

New Haven Mfg. Co., New Haven, Conn.

Sebastian Lathe Co., Cincinnati, O.

Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Lathing, Expanded Metal.
Chess Bros., Pittsburgh, Pa.

Lathing, Wire.
Clinton Wire Cloth Co., Clinton, Mass.

N. J. Wire Cloth Co., Trenton, N. J.

Wright & Colton Wire Cloth Co., Worcester, Mass.

Lawn Mowers.
Anderson, F. S. & Co., Richmond, Ind.

Blair Mfg. Co., Springfield, Mass.

Chadborn & Coldwell Mfg. Co., Newburg, N. Y.

Coldwell Lawn Mower Co., Newburg, N. Y.

Dill & McGuire Mfg. Co., Richmond, Ind.

F. & N. Mfg. Co., Richmond, Ind.

Henley, M. C., Richmond, Ind.

Lawn Rakes.
Gibbs Mfg. Co., Canton, Ohio.

Kohler, F. E. & Co., Canton, O.

Lawn Sprinklers.
Blair Mfg. Co., Springfield, Mass.

Ette & Henger Mfg. Co., St. Louis, Mo.

McGowan, John H. Co., Cincinnati, O.

Letters and Figures, Metallic.
White, A. A. & Co., Providence, R. I.

Letters, Paper.
Tablet & Ticket Co., Chicago, Ill.

Levels.
Richardson, C. F. & Son, Athol, Mass.

Locks and Knobs, Manufacturers of.
Dietz, A. E., 97 Chambers, N. Y.

Reading Hdw. Co., Reading, Pa.

Smith & Egge Mfg. Co., Bridgeport, Conn.

Werner Lock Co., Chicago, Ill.

Yale & Towne Mfg. Co., Stamford, Conn.

Lubricants.
Dixon, Jos., Crucible Co., Jersey City N. J.

Machinery.
Am. Tool Works, Cleveland, Ohio.

Ayer, H. C. & Gleason Co., Phila., Pa.

Barnes, W. F. & John, Rockford, Ill.

Beaman & Smith, Providence, R. I.

Bement, Miles & Co., Philadelphia, Pa.

Bliglow, C. E., 45 Dey, N. Y.

Blignall & Keeeler Mfg. Co., St. Louis.

Bliss, E. W. Co., Brooklyn, N. Y.

Briggs, Marvin, 12 Broadway, N. Y.

Bullard Mch. Tool Co., Bridgeport, Conn.

Carlins' Sons, Thos., Allegheny, Pa.

Clapp, Geo. M., agt., 74 Cortlandt, N. Y.

Detrick & Harvey Mch. Co., Baltimore, Md.

Dietz, Schumacher & Co., Cincinnati, Ohio.

Fitchburg Mch. Works, Fitchburg, Mass.

Garvin Mch. Co., Laight & Canal Sts.

Gould & Eberhardt, Newark, N. J.

Hamilton Mch. Tool Co., Hamilton, O.

Harrington, E. Son & Co., Phila., Pa.

Hartford Machine Screw Co., Hartford, Conn.

Hendey Machine Co., Torrington, Ct.

Hill, Clarke & Co., Boston, Mass.

Howard Morse, 45 Fulton St., N. Y.

Johnson, Israel H., Jr., & Co., Phila.

Jones & Lamson Mch. Co., Springfield, Vt.

Lodge & Davis Mch. Tool Co., Cincinnati, O.

Lodge & Shipley Mch. Tool Co., Cincinnati, O.

McCabe, J. J., 68 Cortlandt, N. Y.

Machinists' Supply Co., Rochester, N. Y.

Manville, E. J., Mch. Co., Waterbury, Conn.

Newark Mch. Tool Wks., Newark, N. J.

New Haven Mfg. Co., New Haven, Ct.

New York Machinery Depot, 178 Broadway, New York.

Niles Tool Wks., 138 Liberty St., N. Y.

Pittsburgh Mch. Co., Pittsburgh, Pa.

Place, Geo., 145 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mchry. Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons, L. F., Philadelphia, Pa.
 Sigourney Tool Co., Hartford, Conn.
 Stepto, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomey, Frank, Philadelphia, Pa.
 Walker Mfg. Co., Cleveland, O.
 Wetherill, Robert & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.
Machinery for Hardware Manufacturers.
 Adt, Jno. & Son, New Haven, Conn.
Machine Knives.
 Loring, Coss & Co., Worcester, Mass.
 Simonds Mfg. Co., Fitchburg, Mass.
Machine Screws.
 American Iron & Bolt Co., Cincinnati, Ohio.
 Hubbell, Harvey, Bridgeport, Ct.
 New Britain Hdwy. Mfg. Co., New Britain, Conn.
 Rhode Island Tool Co., Providence, R. I.
Machine Tools.—See Machinery.
Machine Work.
 Fapping, J., 68th St. & 11th Ave., N. Y.
Machinists' Scales.
 Coffin & Leighton, Syracuse, N. Y.
 Starrett, L. S., Athol, Mass.
Machinists' Tools and Supplies.
 King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.
Manufacturing Sites.
 Chicago, Milwaukee & St. Paul R. R., Chicago, Ill.
Measuring Tapes.
 Lufkin Rule Co., Saginaw, Mich.
Meat Choppers.
 Enterprise Mfg. Co., Philadelphia, Pa.
Meat Cutters.
 North Bros. Mfg. Co., Philadelphia, Pa.
Mechanical Instruction.
 Correspondence School of Mechanics, Scranton, Pa.
Metals.
 Fearing, Wm. S., 100 Chambers, N. Y.
 Hendricks Bros., 49 Cliff, N. Y.
Metal Brokers.
 American Metal Co., N. Y.
Metal Saws.
 Q. & C. Co., Chicago, Ill.
Metallic Ceilings.
 Penn Iron Roofing & Corrugating Co., Phila., Pa.
Metallurgists.
 Britton, J. Blodgett, Phila., Pa.
Mincing Knives.
 Palmer Hdwy. Mfg. Co., Troy, N. Y.
 Streeter, N. R. & Co., Groton, N. Y.
Mine Lamps.
 Darby, Edw. & Sons, Phila., Pa.
 Leonard, B. E., Scranton, Pa.
Mining Screens.
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.
Mining Machinery.
 Allis, E. P. Co., Milwaukee, Wis.
Models, Makers of.
 Ideal Machine Works, Hartford, Conn.
Molding Sand.
 Obermayer, S. Co., Cincinnati, O.
Motors, Water and Electric.
 Bolgiano Mfg. Co., Baltimore, Md.
 C. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
 Dallett, Thomas H. & Co., Phila., Pa.
Nail Keg Stock.
 Crescent Mfg. Co., Detroit, Mich.
Nail Machinery.
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
Nail and Tack Pullers.
 Am. Specialty Co., Hartford, Conn.
 Scranton & Co., New Haven, Conn.
Nails (Cut) and Spikes.
 Borden & Lovell, 70 West, N. Y.
 Pottstown Iron Co., Pottstown, Pa.
 Riverside Iron Wks., Wheeling, W. Va.
Nickel Platers' Supplies.
 Hanson & Van Winkle Co., Newark, N. J.
 Zucker & Levett & Loeb Co., 10 to 14 Grand St., N. Y.
Norway Shapes, Rollers of.
 Rowland, William & Harvey, Franklin, Philadelphia.
Novelty Manufacturers.
 Ideal Machine Works, Hartford, Conn.
Nut Machines.
 Dunham Nut Co., Unionville, Ct.
Nuts, Bolts, Etc., Makers of.
 American Bolt Co., Lowell, Mass.
 American Iron & Bolt Co., Cincinnati, Ohio.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Dunham Nut Co., Unionville, Conn.
 Haskell, Wm. H. Co., Pawtucket, R. I.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Pennsylvania Bolt & Nut Co., Lebanon, Pa.
 Port Chester Bolt & Nut Co., Port Chester, N. Y.
 Rhode Island Tool Co., Providence, R. I.
 Russell, Burdall & Ward, Port Chester, N. Y.
 Sternbergh, J. H. & Son, Reading, Pa.
 Wilson, J. Fred., Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.
Oil Cups and Lubricators.
 Sherwood Mfg. Co., Buffalo, N. Y.
Oilers.
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Oil Heaters.
 Parker, Chas. Co., Meriden, Conn.
 Rochester Lamp Co., 42 Park Place, New York.
Oilless Anti-Friction Metals.
 North American Metalline Co., Long Island City, N. Y.
Oil Stones.
 Pike Mfg. Co., Pike Station, N. H.
Ores.
 Wister, Francis, Philadelphia, Pa.
Ox Shoes.
 Scranton Forging Co., Scranton, Pa.
Packing.
 Morrison, Robert, St. Louis, Mo.
 N. Y. Belting & Packing Co., Ltd., N. Y.
Padlocks.
 Ames Sword Co., Chicopee, Mass.
 Fralin, E. T., Lancaster, Pa.
 Union Lock & Hdwy. Co., Lancaster, Pa.
 Wolf, W. & L., Phila., Pa.
Pails.
 Richmond Cedar Wks., Richmond, Va.
Paint Burners.
 Dangler Stove & Mfg. Co., Cleveland, Ohio.
Paint Cans.
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Painters Stretcher.
 Cover Mfg. Co., West Troy, N. Y.
Patent Solicitors.
 Butler, C. N., Phila., Pa.
 Jenner, H. W. T., Washington, D. C.
 Howson & Howson, Philadelphia and Washington.
 Stocking, E. B., Washington, D. C.
Patent Letters.
 Wells, Heber, 157 William St., N. Y.
Perforated Metal.
 Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.
Phosphor Bronze.
 Phosphor Bronze Smelting Co., Limited, Philadelphia.
Phosphor Tin.
 Crescent Phosphorized Metal Co., Philadelphia, Pa.
 Halk & Naumann, 516 Pearl, N. Y.
Picks and Mattocks.
 Plumb, Fayette R., Philadelphia, Pa.
Pig Iron.
 Houston, C. B. & Co., Philadelphia, Pa.
 Montour Iron & Steel Co., Danville, Pa.
 Taylor & Co., 46 Wall, N. Y.
 Pilling & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.
Pig Iron Storage.
 Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.
Pile Drivers.
 Vulcan Iron Works, Chicago, Ill.
Pipe, Bent.
 National Pipe Bending Co., New Haven, Conn.
Pipe Cutting and Threading Machines.
 Armstrong Mfg. Co., Bridgeport, Conn.
 Bignal & Keeeler Mfg. Co., St. Louis, Mo.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Merrill Mfg. Co., Toledo, O.
 Pancoast, Henry B. & Co., Phila.
 Saunderson's Sons, D., Yonkers, N. Y.
 Taylor-Rice Engineering Co., Wilmington, Del.
 Walworth Mfg. Co., Boston, Mass.
Pipe Grips.
 Prentiss Vise Co., 44 Barclay, N. Y.
Pipes, Fittings, &c., Makers of.
 McNab & Harlin Mfg. Co., N. Y.
Pipe, Water and Gas, Makers of.
 Donaldson Iron Co., Emmaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.
Plane Irons, Manufacturers of.
 Buck Bros., Millbury, Mass.
 Buck, Chas., Millbury, Mass.
Planers.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 New Haven Mfg. Co., New Haven, Conn.
 Powell Planer Co., Worcester, Mass.
 Wilson, W. A., Worcester, Mass.
Planes, Manufacturers of.
 Stanley Rule & Level Co., N. Y.
Plated Ware.
 Boardman, L. & Son, New Haddam, Ct.
 Holmes & Edwards Silver Co., Bridgeport, Conn.
 Rogers, Wm. Mfg. Co., Hartford, Ct.
Plate, Iron and Steel, Mfrs. of.
 Aetna-Standard Iron & Steel Co., Bridgeport, O.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Mahoning Valley Iron Co., Youngstown, Ohio.
 Moorhead-McLean Co., Pittsburgh, Pa.
 McIlvain & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Wood, Alan Co., Philadelphia.
Plating, Nickel, Brass and Silver.
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Polishing Machines.
 Watson & Stillman, 204 E. 43d, N. Y.
Post Hole Diggers.
 Gibbs Mfg. Co., Canton, Ohio.
 Iwan Bros., Streator, Ill.
 Kohler, F. E. & Co., Canton, O.
Poultry Nettings.
 Burdum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J.
 "Silver Finish."
 Tyler Wire Works Co., W. S., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.
Powder.
 Laffin & Rand Powder Co., 29 Murray New York Powder Co., 62 Liberty St., N. Y.
Powder Hammers.
 Deneott & Eisenhardt, Philadelphia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Jenkins & Lingle, Bellfonte, Pa.
 Long & Alstatter Co., Hamilton, Ohio.
 Miner & Peck Mfg. Co., New Haven Conn.
 Scranton & Co., New Haven, Conn.
Power Transmitting Machinery.
 Dodge Mfg. Co., Mishawaka, Ind.
Presses, Dies, &c.
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Feraracite Mch. Co., Bridgeton, N. J.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury Ct.
Presses, Power, Makers of.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Merrill, A. H., Meriden, Conn.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Printing and Embossing.
 Griffith, Axtell & Cady Co., Holyoke, Mass.
Pruners.
 Tolpiff & Ely Co., Elyria, Ohio.
 Henry, J. T. Mfg. Co., Hamden, Conn.
Pulleys.
 Brown, A. & F., 17 Dey St., N. Y.
 Dodge Mfg. Co., Mishawaka, Ind.
 Keystone Clutch Mch. Wks., Phila., Pa.
 Reading Wood Pulley Co., Reading, Pa.
 Reeves Pulley Co., Columbus, Ind.
Pumping Machinery.
 Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Hooker-Colville Steam Pump Co., St. Louis, Mo.
 Lucas, C. O. & Co., Greenville, Ohio.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Works Co., So. Norwalk Conn.
 Southwark Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Works, Easthampton, Mass.
 Worthington, Henry R., 86 and 88 Liberty St., N. Y.
Pump Leathers.
 Detroit Valve & Washer Co., Detroit, Mich.
Pumps, Makers of.
 Deming Co., Salem, O.
 Douglas, W. & B., Middletown, Conn.
 Enterprise Co., Sandwich, Ill.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Miller, C. S. & Sons, Utica, N. Y.
 Myers, F. E. & Bro., Ashland, O.
 Peters Pump Co., Kewanee, Ill.
 Red Jacket Mfg. Co., Davenport, Iowa.
Punches.
 Richards, I. P., Providence, R. I.
Punches and Shears, Hand and Power.
 Bertsch & Co., Cambridge City, Ind.
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Feraracite Mch. Co., Bridgeton, N. J.
 Long & Alstatter Co., Hamilton, Ohio.
 Stiles & Parker Press Co., Brooklyn, N. Y.
Wals & Root Punch & Shear Co., Cincinnati, Ohio.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.
Rails, Old and New.
 Perry, W. H. & Co., Providence, R. I.
Rat and Mouse Traps.
 Burditt & Williams, Boston, Mass.
 Estey, W. S., 65 Fulton, N. Y.
 Ercelior Cutlery Co., Worcester, Mass.
Razor, Manufacturers of.
 Millbury Razor Co., Millbury, Mass.
 Swedish Razor Co., Worcester, Mass.
Re-Seating Machines.
 Leavitt Mch. Co., Orange, Mass.
Reducing Valves.
 D'Este & Seeley Co., Boston, Mass.
Reels.
 Hendryx, A. B. Co., New Haven, Conn.
Refrigerator Door Fasteners.
 Conroy, P. J. & Co., Philadelphia.
Rivets.
 Blake & Johnson, Waterbury, Conn.
 Burden Iron Co., Troy, N. Y.
 Clark & Cowles, Plainville, Conn.
 Sternbergh, J. H. & Son, Reading, Pa.
 Townsend, W. P. & Co., New Brighton, Pa.
Riveting Machines.
 Adt, Jno. & Sons, New Haven, Conn.
Rolling Mill Machinery.
 Birmingham Iron Fdy., Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 Leechburg Foundry & Mch. Co., Pittsburgh, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburgh.
 Totten & Hogg Iron and Steel Co., Pittsburgh, Pa.
 Tretewhey Mfg. Co., Pittsburgh, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury Conn.
Roll Paper Holders.
 Am. Roll Paper Co., St. Louis, Mo.
Rolls, Chilled, Sand and Steel.
 Birmingham Iron Foundry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 East Chicago Fdy. Co., Chicago, Ill.
 Garrison, A. F. Co., Pittsburgh, Pa.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Seaman, Sleeth & Black, Pittsburgh.
 Totten & Hogg Iron and Steel Fdy. Co., Pittsburgh, Pa.
Roofing.
 Cincinnati Corrugating Co., Piqua, O.
 N. Y. Iron Roofing & Corrugating Co., Jersey City, N. J.
Rope and Web Goods.
 Covert Mfg. Co., West Troy, N. Y.
 Covert's Saddlery Wks., Farmer, N. Y.
Rope Wheels.
 Cresson, Geo. V. Co., Philadelphia, Pa.
Rubber Goods.
 Canfield, H. O., Bridgeport, Conn.
Rules, Manufacturers of.
 Stanley Rule & Level Co., 29 Chambers, Stephen & Co., Riverton, Conn.
Sad Irons.
 Enterprise Mfg. Co., Phila., Pa.
 Streeter, N. R. & Co., Groton, N. Y.
Sad Irons, Gas.
 Bolgiano Mfg. Co., Baltimore, Md.
Sample Holder.
 Massey & Thompson, Monroe City, Mo.
Sand Paper.
 Baeder, Adamson & Co., Phila., Pa.
Sash Balances.
 Caldwell Mfg. Co., Rochester, N. Y.
 Fullman Sash Balance Co., Rochester, N. Y.
Sash Cords and Chains.
 Morton, Thos., 65 Elizabeth, N. Y.
 Samson Cordage Works, Boston, Mass.
 Smith & Egge Mfg. Co., Bridgeport.
Sash Fasteners.
 Wooster, F. V., Boston, Mass.
Sash Locks.
 Champion Safety Lock Co., Cleveland, Ohio.
 Ives, H. B. & Co., New Haven, Conn.
Sash Pulleys.
 Palmer Hardware Mfg. Co., Troy, N. Y.
Sash Weights.
 Brown, E. E. & Co., Philadelphia, Pa.
 Klug County Iron Foundry, Brooklyn, N. Y.
 Norton Bros., Chicago, Ill.
Saw Filing Machines.
 Ditsion, Henry & Sons, Philadelphia, Pa.
Saws, Makers of.
 Atkins, E. C. & Co., Indianapolis, Ind.
 Butler Mfg. Co., Boston, Mass.
 Ditsion, Henry & Sons, Phila., Pa.
 National Saw Co., Newark, N. J.
 Simonds Mfg. Co., Fitchburg, Mass.
Saw Sets.
 Taintor Mfg. Co., 84-86 Chambers, N. Y.
Saw Vises.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Sawing Machines.
 Q. & C. Co., Chicago, Ill.
Scales, Manufacturers of.
 Buffalo Scale Co., Buffalo, N. Y.
 Chatillon, John & Sons, 85-89 Cliff, N. Y.
 Standard Scale & Fixtures Co., St. Louis, Mo.
Scrapers, Road.
 Sidney Steel Scraper Co., Sidney, O.
Screeens, Coal and Ore.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.
Screeens, Window and Door.
 Phillips, A. J. Co., Fenton, Mich.
Screw and Bolt Cases.
 Smith Bros. Hdw. Co., Columbus, O.
Screw Cutting Machinery.
 Wells Bros. & Co., Greenfield, Mass.
 Wiley & Russell Mfg. Co., Greenfield Mass.
Screw Drivers.
 Brown, R. H. & Co., New Haven, Conn.
 Gay & Parsons, Mayhew, H. H. Co., Shelburne Falls, Mass.
Screw Machinery.
 Hartford Machine Screw Co., Hartford, Conn.
Screw Plate and Pipe Cutter.
 Jarecki Mfg. Co., Erie, Pa.
Screws, Makers of.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Wm. H. Haskell Co., Pawtucket.
 Miles, F. S., 206 Quarry, Philadelphia.
 Reynolds & Co., New Haven, Conn.
 Worcester Machine Screw Co., Worcester, Mass.
Scroll Saws.
 Barnes, W. F. & John, Rockford, Ill.
 Millers Falls Co., 93 Read St., N. Y.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Scythe Stones and Whetstones.
 Pike Mfg. Co., Pike Stat'n, N. H.
 Cleveland Stone Co., Cleveland, O.
Shafting, Makers of.
 Brown, A. & F., 17 Dey St., N. Y.
 Cresson, Geo. V. Co., Philadelphia, Pa.
 Fairmount Mch. Co., Philadelphia, Pa.
 Sellers, Wm. & Co., Inc., Phila., Pa.
 Stow Mfg. Co., Binghamton, N. Y.
Shaft Support.
 Decatur Shaft Support Co., Decatur, Ill.
Shaped Iron and Steel, Manufacturers of.
 Aetna-Standard Iron & Steel Co., Bridgeport, O.
 East Chicago Fdy. Co., Chicago, Ill.

Allentown Rolling Mill, Allentown, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
The Phoenix Iron Co., Phila., Pa.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.

Shears and Scissors.

Acme Shear Co., Bridgeport, Conn.
Claus Shear Co., Fremont, Ohio.
Heinrichs, R. Sons Co., Newark, N.J.

Sheet Iron and Steel, Manufacturers of.

Etna-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Jersey City Galvanizing Co., 112 John St., N.Y.
Mahoning Valley Iron Co., Livingston, Ohio.
Morehead-McCleane Co., Pittsburgh.
Pierson & Co., 29 Broadway, N.Y.
Singer, Nimick & Co., Ltd., Pittsburgh, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.

Sheet Zinc.

Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Shelf Brackets.

Atlas Mfg. Co., New Haven, Conn.
Stanley Works, New Britain, Conn.

Shoe Stands.

Kupferle, Jno. C., St. Louis, Mo.

Shovels.

Peninsular Metal Works, Detroit, Mich.

Show Cases.

Union Show Case Co., Chicago, Ill.

Sinks.

Douglas, W. & B., Middletown, Conn.

Skate Grinding Machinery.

Perkins, Chas., Bridgewater, Mass.

Skates, Ice.

Barney & Berry, Springfield, Mass.
Dame, Stoddard & Kendall, Boston, Mass.
Keene Mfg. Co., Keene, N.H.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Skates, Roller.

Henley, M. C., Richmond, Ind.
Union Hardware Co., Torrington, Ct.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Slag Machines.

Cambridge Iron Co., Johnstown, Pa.

Slaw Cutters.

Tucker & Dorsey Mfg. Co., Indianapolis, Ind.

Smelting Works.

Reeves, Paul S., 760 S. Broad, Phila.

Snow Shovels.

Phillips, A. J. Co., Fenton, Mich.

Soldering Coppers.

Cleenden Bros., Baltimore, Md.

Covert Mfg. Co., West Troy, N.Y.

Speaking Tubes.

Ostrander, W. R. & Co., 204 Fulton St., N.Y.
Wollensak, J. F., Chicago, Ill.

Special Machinery.

Rhodes, L. E. Co., Hartford, Conn.

Spelter.

Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Spoons and Forks.

Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.
Rogers, The Wm. Mfg. Co., Hartford, Conn.

Sporting Goods.

Hartley & Graham, 313-315 B'way, N.Y.

Springs.

Clark & Cowles, Plainville, Ct.
Coiled Wire Belting Co., Jersey City, N.J.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N.Y.
Morgan Spring Co., Worcester, Mass.
Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N.Y.

Spring Hinges.

Bommer Bros., Brooklyn, N.Y.
Pullman Sash Balance Co., Rochester, N.Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Hdw. Co., 14 Warren St., N.Y.

Stamping Works.

Avery Stamping Co., Cleveland, O.
Cleveland Stamping & Tool Co., Cleveland, O.

Staples.

Cobb & Drew, Plymouth, Mass.
Titchener, E. H. & Co., Binghamton, N.Y.

Steam Gauges.

Bristol Co., Waterbury, Conn.
Star Brass Mfg. Co., Boston, Mass.

Steam Hammers, &c., Makers of.
Dienelt & Elsener, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N.Y.
Trehewey Mfg. Co., Pittsburgh, Pa.

Steam Heating & Oil Separators.

Webster, Warren & Co., Camden, N.J.

Steam Separators.

Harrison Safety Boiler Wks., Phila., Pa.

Webster, Warren & Co., Camden, N.J.

Steam Specialties.

D'Este & Seeley Co., Boston, Mass.

Lunkenheimer Co., Cincinnati, O.

Steam Traps.

D'Este & Seeley Co., Boston, Mass.

Steel, Cold Rolled Strip.

Superior Steel Co., Pittsburgh, Pa.

Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel Figures and Alphabet.

Hoefig, C. W., 52 Fulton St., N.Y.

Krogrud, W., 61 Fulton St., N.Y.

Steel Importers.

Abbott, Wheelock & Co., N.Y. and Boston.

Edson, Francis, Seaman & Co., 97 John St., N.Y.

Jenck, Wm. & Sons, Sheffield, England, or 91 John N.Y.

Milne & Son, 1 Broadway, N.Y.

Newton & Shipman, 83 John N.Y.

Wetherell Bros., 93 Liberty St., N.Y.

Whitney, A. R. & Co., B'way, N.Y.

Wolff, R. H. & Co., Ltd., 118th Street and Harlem River, N.Y.

Steel (Muguet's Special).

Jones, B. M. & Co., Boston.

Steel Manufacturers.

Etna-Standard Iron & Steel Co., Bridgeport, O.

Bethlehem Iron Co., S. Bethlehem, Pa.

Boker, Hermann & Co., 103 Duane St., Carbon Steel Co., Pittsburgh, Pa.

Chester Steel Casting Co., Phila., Pa.

Chrome Steel Works, Brooklyn, N.Y.

Crescent Steel Co., Pittsburgh, Pa.

Frankford Steel Co., Philadelphia.

Gauthier Steel Department of Cambria Iron Co., Johnstown, Pa.

Hobson, Francis, Seaman & Co., 97 John St., N.Y.

Jessop, Wm. & Sons, Sheffield, England, or 91 John N.Y.

Kayser, Ellwood & Co., Sheffield, Eng.

La Belle Steel Co., Pittsburgh, Pa.

Landon Iron Co., Salisbury, Conn.

Lukens Iron & Steel Co., Coatesville, Pa.

Moorhead-McCleane Co., Pittsburgh, Pa.

Moss, F. W., 83 John, N.Y.

Pottsville Iron and Steel Co., Pottsville, Pa.

Rowland, Wm. & Harvey, Frankford, Philadelphia.

Singer, Nimick & Co., Pittsburgh.

Superior Steel Co., Pittsburgh, Pa.

Wetherell Bros., 93 Liberty, N.Y.

Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel Manufacturers' Agents.

Barns, C. K. & Co., Philadelphia, Pa.

Butze, Adolph, St. Louis, Mo.

Corning, Edw. & Co., 29 B'way, N.Y.

Lindsay, Jas. G. & Co., Phila., Pa.

Pierson & Co., 29 Broadway, N.Y.

Steel Rails, Manufacturers of.

Bethlehem Iron Co., S. Bethlehem, Pa.

Cambridge Iron Co., Johnstown, Pa.

Montour Iron & Steel Co., Danville, Pa.

Riverside Iron Wks., Wheeling, W. Va.

Steel Tool.

Frankford Steel Co., Philadelphia, Pa.

Jessop, Wm. & Sons, Sheffield, England, or 91 John N.Y.

Jones, B. M. & Co., Boston, Mass.

La Belle Steel Co., Pittsburgh, Pa.

Step Ladders, Rolling.

Bicycle Step Ladder Co., Chicago, Ill.

Cubore Trolley Track Mfg. Co.

Holyoke, Mass.

Croissant, M., Albany, N.Y.

Stocks and Dies.

Armstrong Mfg. Co., Bridgeport, Conn.

Billings & Spencer Co., Hartford, Conn.

Butterfield & Co., Derby Line, Vt.

Hart Mfg. Co., Cleveland, O.

Oster Mfg. Co., Johnstown, O.

U. S. Projectile Co., Brooklyn, N.Y.

Randolph & Clowes, Waterbury, Conn.

Stocks and Dies.

Armstrong Mfg. Co., Bridgeport, Conn.

Billings & Spencer Co., Hartford, Conn.

Butterfield & Co., Derby Line, Vt.

Hart Mfg. Co., Cleveland, O.

Oster Mfg. Co., Johnstown, O.

U. S. Projectile Co., Brooklyn, N.Y.

Ward & Clark, B'way, N.Y.

ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Wheelock & Co.	20	Benson Supply Co.	90	Crawford Mfg. Co.	36	Goulds Mfg. Co.	40
Acme Shear Co.	77	Brown, A. & F.	53	Crescent Horse Shoe & Iron Co.	105	Gouverneur Machine Co.	53
Adt, John & Son.	43	Brown, E. E. & Co.	101	Crescent Mfg. Co.	8	Graham, John H. & Co.	89
Aetna-Standard Iron & Steel Co.	22	Brown Hoisting & Conveying Mch. Co.	40	Crescent Phosphorized Metal Co.	3	Grand Crossing Tack Co.	12
Aiken, Henry.	28	Brown, R. H. & Co.	68	Crescent Steel Co.	22	Grand Rapids Cycle Co.	86
Alexander Bros.	41	Bryan Mfg. Co.	110	Cresson, Geo. V. Co.	53	Grand Rapids Hand Screw Co.	81
Allentown Hdw. Wks.	94	Bryden Horse Shoe Co.	103	Croissant, M.	96	Green, A. H.	74
Allentown Rolling Mills.	23	Buck Bros.	77	Crosby, G. A. & Co.	44	Griffith, Axtell & Cady Co.	76
Allis, E. P. Co.	30	Buck, Chas.	77	Crown Smelting Co.	3	Gwinther Mfg. Co.	91
Am. Axe & Tool Co.	80	Buckeye Mfg. Co.	74	Cushman Chuck Co.	50	Haight & Clark.	27
American Bolt Co.	113	Buffalo Forge Co.	122	Cutter, Wood & Stevens	57	Halk & Naumann.	8
American Iron & Bolt Co.	15	Buffalo Scale Co.	107	Dallett, Thos. H. & Co.	52	Halsey, Jas. T.	50
American Metal Co.	3	Buhl Stamping Co.	96	Dame, Stoddard & Kendall.	83	Hamilton Machine Tool Co.	45
American Pig Iron Storage Warrant Co.	21	Bulard Mch. Tool Co.	58	D'Amour & Littledale.	47	Hammer & Co.	107
Am. Roll Paper Co.	85	Burditt & Williams	69	Dangler Stove & Mfg. Co.	90	Hanson & Van Winkle Co.	31
American Screw Co.	13	Burden Iron Co.	103	Darby, Edw. & Sons.	8	Hardware Board of Trade.	63 b
American Specialty Co.	77	Burke, P. F.	105	Davis, I. B. & Son.	37	Harrington, E., Son & Co.	45
American Tool Co.	76	Burr & Houston Co.	25	Davis, W. P.	59	Harrington & King Perforating Co.	10
American Tool Works.	59	Bussenius & Cumlife.	60	Davol, John & Sons.	2	Harrington & Richardson Arms Co.	85
American Wire Co.	9	Butler, C. N.	6	Dean Bros. Steam Pump Works.	39	Harris, Wm. A. Steam Engine Co.	33
Ames Sword Co.	101	Butler Mfg. Co.	71	Decatur Shaft Support Co.	105	Harrison Safety Boiler Wks.	35
Amidon Tool Corporation.	76	Butterfield & Co.	50	Deitz, A. E.	100	Hart Mfg. Co.	50
Anderson, F. S. & Co.	112	Butts & Ordway.	44	Deming Co.	70	Hartford Machine Screw Co.	57
Ansonia Brass & Copper Co.	2	Butze, Adolph.	62	Detrick & Harvey Machine Co.	55	Hartford Steam Boiler Insp. and Ins. Co.	31
Appleton Mfg. Co.	51	Byers, Jno. F. Mch. Co.	56	Detroit Valve & Washer Co.	39	Hartley, Graham.	1
Arcade File Works.	74	C. & C. Electric Co.	31	Diamond Machine Co.	56	Haskell, Wm. H. Co.	114
Arcade Malleable Iron Co.	23	Caldwell Mfg. Co.	101	Dieneit & Eisenhardt.	47	Hazard Mfg. Co.	6
Arcade Mfg. Co.	95	California Wire Works.	6	Dietz, Schumacher & Co.	42	Heinisch's R. Sons Co.	77
Armstrong Bros. Tool Co.	52	Cambrion Iron Co.	21&24	Dille & McGuire Mfg. Co.	111	Henderson Bros.	25
Armstrong Mfg. Co.	51	Cambridge Iron & Steel Co.	16	Disston, Henry & Sons.	73	Hendey Machine Co.	66
Arnold Metal Wheel Co.	109	Canfield, H. O.	41	Dixon, Jos., Crucible Co.	41	Hendricks Bros.	2
Athol Machine Co.	71	Capewell Horse Nail Co.	104	Dodd, A. W. & Co.	1	Hendrick Mfg. Co., Ltd.	7
Atkins, E. C. & Co.	72	Carbon Steel Co.	22	Dodge Mfg. Co.	53	Hendryx, A. B. Co.	8
Atlas Mfg. Co.	122	Carlins' Sons, Thomas.	59	Donaldson Iron Co.	25	Henley, M. C.	85&111
Atlas Tack Corporation.	12	Carpenter J. M. Tap & Die Co.	121	Douglas, W. & B.	70	Henry, J. T. Mfg. Co.	95
Avery Stamping Co.	79	Carroll Muzzle Co.	113	Dow Wire Works Co.	7	Herrick, J. A.	29
Ayer, H. C. & Gleason Co.	42	Carter & Co.	79	Draper Machine Tool Co.	59	Herrick & Cowell.	50
Babcock & Wilcox Co.	38	Cary Mfg. Co.	88	D'Este & Seeley Co.	33	Hiertz, T. & Son.	3
Baeder, Adamson & Co.	68	Central Iron & Steel Co.	28	Dudgeon, Richard.	48	Hill, Clarke & Co.	61
Banker & White.	75	Chadborne & Coldwell Mfg. Co.	111	Dunbar Bros.	4	Hobson, F., Seaman & Co.	20
Barber-Koenig Mfg. Co.	86	Chambers Bros. Co.	114	Dunham Nut Co.	113	Hoefig, C. W.	71
Bardsley, J.	108	Champion Blower & Forge Co.	50	Dupont Mfg. Co.	42	Hoffman, C. & A.	113
Barnes, C. K. & Co.	24	Champion Iron Co.	7	Durant, W. N.	40	Hoffman, J. W. & Co.	19
Barnes, W. F. & John.	41	Champion Safety Lock Co.	100	Dwight slate Machine Co.	44	Hogan, John L. & Co.	19
Barnett, G. & H.	75	Chandler & Taylor Co.	31	Eagle Bicycle Mfg. Co.	121	Hoggson & Pettis Mfg. Co.	50
Barney & Berry.	83	Chapman Valve Mfg. Co.	33	East Chicago Foundry Co.	25	Hollands Mfg. Co.	71
Barnum, E. T.	7	Chatillon, John & Sons.	90	Eccles, Richard.	106	Holmes & Edwards Silver Co.	78
Bass Foundry & Machine Works.	35	Cheney, S. & Son.	25	Egan Co.	57	Hoover-Colville Steam Pump Co.	39
Bay State Stamping Co.	56	Chees Bros.	25	Electric Construction & Supply Co.	32	Houston, C. B. & Co.	19
Beaman & Smith.	58	Chester Steel Casting Co.	26	Enterprise Co.	81	Howard Iron Works.	75
Bement, Miles & Co.	47	Chicago Fire Arms Co.	88	Enterprise Mfg. Co. of Pa.	25	Howard & Morse.	7
Bemis & Call Hardware & Tool Co.	107	Chrome Steel Works.	31	Este, W. S.	6	Howson & Howson.	6
Berger Bros.	101	Church, Isaac.	114	Ette & Henger Mfg. Co.	109	Hubbell, Harvey.	113
Bertsch & Co.	43	Cincinnati Barb Wire Fence Co.	11	Etting, Edw. J.	19	Hutchinson, F. S. Co.	76
Bethlehem Iron Co.	24	Cincinnati Corrugating Co.	10	Eureka Cast Steel Co.	122	Huyett & Smith Mfg. Co.	29
Bevin Bros. Mfg. Co.	86	Clafien Mfg. Co.	41	Excelsior Needle Co.	122	Ideal Machine Works.	53
Bickford Drill & Tool Co.	45	Clapp, E. D. Mfg. Co.	103	Eynon-Evans Mfg. Co.	30	Ideal Mfg. Co.	86
Bicycle Step Laddered Co.	95	Clapp, Geo. M.	60	F. & N. Mfg. Co.	109	Independent Electric Co.	86
Bigelow, C. R.	60	Clark, G. P.	108	Fairmount Machine Co.	55	Indiana Wire Fence Co.	7
Bignal & Keeler Mfg. Co.	47	Clark & Cowles.	5	Fearing, Wm. S.	2	Iowa Farming Tool Co.	108
Billings & Spencer Co.	107	Clark Mfg. Co.	100	Ferdinand L. W. & Co.	69	Ives, H. B. & Co.	106
Bingham, W. Co.	86	Clarke, Thomas.	78	Ferracute Machine Co.	43	Iwan Bros.	107
Birmingham Iron Foundry.	25	Clauss Shear Co.	79	Fitch, W. & E. T.	121	Jacobus, W. H.	114
Bissell, E. Son & Co.	62	Clendenin Bros.	12	Fitchburg Machine Works.	40	Jarecki Mfg. Co.	49
Blair Mfg. Co.	109	Cleveland Block Co.	101	Flagg, Stanley G. & Co.	122	Jeffrey Mfg. Co.	40
Blake & Johnson.	11	Cleveland City Forgo & Iron Co.	1	Flint & Co.	22	Jenkins Bros.	1
Bliss Co., E. W.	42	Cleveland Stamping & Tool Co.	94	Folding Paper Box Co.	76	Jenkins & Linglie.	41
Blount Mfg. Co.	97	Cleveland Stone Co.	56	Fram, E. T.	101	Jenner, H. W. T.	6
Boardman, L. & Son.	77	Cleveland Twist Drill Co.	52	Frankford Steel Co.	21	Jersey City Galvanizing Co.	16
Boker, Hermann & Co.	20	Cleveland Wood Turning Co.	96	Fray, Jno. S. & Co.	81	Jessop, Wm. & Sons.	20
Boligano Mfg. Co.	91	Clinton Wire Cloth Co.	8	Frost Thill Spring Co.	105	Johnson, I. H., Jr. & Co.	54
Bommer Bros.	122	Cobb & Drew.	10	Gulton Iron & Engine Works.	54	Jones, B. M. & Co.	22
Bond Nail Co.	11	Colburn Trolley Track Mfg. Co.	97	Gardner, Jas. & Son.	30	Jones, Jesse & Co.	75
Boone, W. C. Mfg. Co.	25	Coles, Loring & Co.	108	Garland Chain Co.	18	Jones & Lamson Machine Co.	66
Booth, The Lloyd Co.	30	Coles Wrench Co.	108	Garrison, A., Foundry Co.	24	Kay, J. F.	4
Borden & Lovell.	11	Coffin & Leighton.	43	Garry Iron Roofing Co.	113	Keyser, Ellison & Co.	20
Borgner, Cyrus.	80	Colled Wire Belting Co.	101	Gartland Foundry Co.	27	Keeley, Jerome & Co.	19
Boston Casting Co.	3	Colby Wringer Co.	90	Garvin Machine Co.	60	Keene Mfg. Co.	83
Boston Gear Works.	36	Coldwell Lawn Mower Co.	110	Gauthier Steel Department.	16	Kennedy, Julian.	28
Box, Alfred & Co.	57	Coleman, J. A.	62	Gay & Parsons.	74	Keys, W. W. & R. M. Co.	3
Bradlee & Co.	18	Conroy, P. J. & Co.	90	Gaylord, F. L. Co.	3	Keystone Clutch & Machine Works.	50
Brass Goods Mfg. Co.	2	Continental Iron Works.	35	Gibbs Mfg. Co.	110	Kilmer Mfg. Co.	7
Bridgeport Deoxidized Bronze & Metal Co.	2	Corning, Edw. & Co.	18	Gilbert & Bennett, Mfg. Co.	8	Kimball Bros. & Co.	12
Bridgeport Gun Implement Co.	86	Correspondence School of Mechanics.	67	Gillette Clipping Machine Co.	81	King, J. M. & Co.	75
Briggs, Marvin.	60	Cotton, Barclay W. & Co.	18	Gleason Tool Co.	31	Kings County Iron Foundry.	108
Bristol Co.	1	Covert Mfg. Co.	68	Goddard, Asa.	44	Kohler, F. E. & Co.	108
Britton, J. Blodgett.	29	Covert's Saddlery Works.	67	Goodell Co.	92		
Broderick & Bascom Reo. Co.	6	Cox, Justice Jr.	19	Goodell, J. W. Co.	76		
		Crampton Metal Mfg. Co.	40	Gould & Eberhardt.	40		

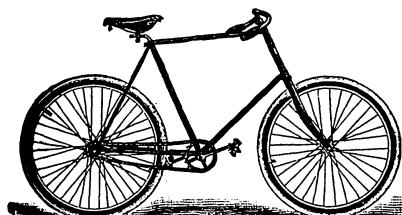
Kreischer, B. & Sons.....	30	New Haven Mfg. Co.	47	Riverside Iron Works.....	22	Taunton Locomotive Mfg. Co.	36
Krogsrud, W.....	69	New Haven Wire Mfg. Co.	6	Roberts, A. & P. & Co.	21	Taunton Wire Nail Co.	11
Kupferle, Jno. C.....	636	N. J. Wire Cloth Co.	8	Roberts Mfg. Co.	40	Taylor-Rice Engineering Co.	65
La Belle Steel Co.	28	New Process Twist Drill Co.	52	Robinson-Rea Mfg. Co.	24	Taylor & Boggis Foundry Co.	26
Laflin & Rand Powder Co.	25	Newton & Shipman.	20	Rochester Lamp Co.	89	Thomas, G. W. & Co.	111
Landon Iron Co.	24	N. Y. Belting & Packing Co.	41	Rogers, The Wm. Mfg. Co.	78	Thomas, W. H.	62
Lane & Bodley Co.	36	N. Y. Powder Co.	25	Rome Brass & Copper Co.	2	Thomson, W. H. & Co.	19
Lane Brothers.	101	N. Y. Iron Roofing & Corrugating Co.	10	Rowland, Wm. & Harvey.	122	Tibout, W. & J.	100
Laughlin, Alex & Co.	28	N. Y. Wire Cloth Co.	9	Russell, Burdall & Ward.	122	Titchener, E. H. & Co.	12
Lay, Jos. & Co.	92	Nichols Bros.	78	Russell & Erwin Mfg. Co.	98	Tod, Wm. & Co.	35
Lea, J. Tattnall & Co.	23	Nicholson File Co.	75	Russia Cement Co.	69	Toomey, Frank.	60
Lean, D. R. Co.	29	Nicolls, Wheeler & Co.	20	Sabin Machine Co.	5	Topliff & Ely Co.	91
League Cycle Co.	121	Niles Tool Works.	61	Salem Wire Nail Co.	11	Torrance Iron Co.	27
Leavitt Machine Co.	32	North Brs. Mfg. Co.	21&67	Samson Cordage Works.	1	Totten & Hogg Iron and Steel Fdry. Co.	
Le Count, C. W.	105	North American Metalline Co.	3	Samuel, Frank.	18	Co.	25 & 38
Leechburg Foundry & Machine Co.	25	Northampton Cutlery Co.	78	Saunder's Sons, D.	48	Tower & Lyon.	82
Leng's, Jno. S. Son & Co.	122	Northampton Emery Wheel Co.	56	Saunder Hdw. & Supply Co.	32	Townsend, W. P. & Co.	114
Leonard, B. E.	107	Norton Bros.	106	Scattergood, H. W.	58	Tracy, A. J. Co., Ltd.	71
Leonard, J.	24	Norton Emery Wheel Co.	56	Scheeler & Sons.	9	Trenton Iron Co.	4
Leschen, A. & Sons Rope Co.	6	Norwalk Iron Works Co.	39	Schneider & Trenkamp Co.	94	Trethoven Mfg. Co.	28
Levis, Henry & Co.	24	Obermayer, S. Co.	24	Scott, Geo. M.	32	Trimont Mfg. Co.	107
Lidgerwood Mfg. Co.	122	Ogden & Wallace.	24	Scoville Mfg. Co.	2	Trixie Hair Curler Co.	88
Lincoln Iron Works.	45	Old Dominion Iron & Nail Works Co.	103	Scranton & Co.	44	Tucker & Dorsey Mfg. Co.	94
Lindsay, Jas. G. & Co.	19	Olds Wagon Works.	93	Scranton Forging Co.	103	Tudor Iron Works.	1
Link-Belt Engineering Co.	44	Oster Mfg. Co.	51	Scranton Supply & Machine Co.	59	Tyler Wire Works Co. W. S.	66
Lockhart Iron & Steel Co.	20	Ostrander Fire Brick Co.	30	Seaman, Sleeth & Black.	25	Union Hardware Co.	82
Logan & Stowbridge Iron Co.	95	Ostrander, W. R. & Co.	91	Sebastian Lathe Co.	54	Union Lock & Hdw. Co.	100
Long & Allstatter Co.	43	Otto Gas Engine Works.	37	Sellers, Wm. & Co.	55	Union Mfg. Co.	51
Lovell, Jno. P. Arms Co.	122	Palmers & De Mooy Fdry. Co.	26	Seneca Falls Mfg. Co.	54 & 72	Union Metallic Cartridge Co.	1
Lucas, C. O. & Co.	37	Palmer Hardware Mfg. Co.	68	Sessions Foundry Co.	23	Union Show Case Co.	76
Ludlow-Saylor Wire Co.	7	Pancoast, Henry B. & Co.	49	Seyfert's Sons, L. F.	59	U. S. Projectile Co.	18&635
Lufkin Rule Co.	71	Peck, A. G. & Co.	122	Shelby Steel Tube Co.	29	Valentine, M. D. & Bro. Co.	30
Lukens Iron & Steel Co.	18	Peerless Mfg. Co.	93	Shelton Co.	12	Valley Pump Co.	38
Lundberg, Gustaf.	21	Peninsular Metal Works.	70	Shepard, Sidney & Co.	94	Van Dorn Iron Works Co.	7
Lunkheimer Co.	34	Pennsylvania Bolt & Nut Co.	112	Sherwood Mfg. Co.	38	Van Wagoner & Williams Hdw. Co.	122
McCabe, J. J.	59	Pennsylvania Elevator Engineering Co.	54	Shickle, Harrison & Howard Iron Co.	26	Variety Machine Co.	56
McCaffrey File Co.	75	Pennsylvania Mch. Co.	59	Shoenberger & Co.	102	Vulcan Iron Works.	27
McCallip Fence & Wire Works.	11	Perkins, B. F. & Son.	45	Shulta Belting Co.	1	Wais & Roos Punch & Shear Co.	43
McClure & Amsler.	20	Perkins, Chas.	8d	Sickels, Sweet & Lyon.	85	Walker Mfg. Co.	27
McCoy, Jos. F. Co.	49	Perry, W. H. & Co.	61	Sherwood Mfg. Co.	110	Wallace Wm. H. & Co.	24
McFarland, Wm.	4	Perry & Whipple Co.	106	Sigourney Tool Co.	45	Walworth Mfg. Co.	121
McGowan, J. H. & Co.	29	Peters Pump Co.	72	"Silver Finish".	9	Wardlow, S. & C.	20
McIlvain, Wm. & Sons.	19	Philadelphia Engineering Wks.	29	Silver Mfg. Co.	107	Warner Elevator Mfg. Co.	54
McKay, Jas. & Co.	18	Phillips, A. J. Co.	92	Simonds Mfg. Co.	72	Warner Lock Co.	97
McKinney Mfg. Co.	100	Phoenix Horseshoe Co.	103	Slinger, Nimick & Co.	23	Washburn & Moen Mfg. Co.	4
McLean, John.	35	Phoenix Iron Co.	18	Skinner Chuck Co.	50	Waterbury Brass Co.	3
McNab & Harlin Mfg. Co.	35	Phosphor Bronze Smelting Co.	3	Smith, Heber.	58	Waterbury Farrel Foundry & Machine Co.	47
Machinists' Supply Co.	60	Pierson & Co.	21	Smith Bros. Hardware Co.	63b	Waterbury Machine Co.	51
Mahoning Valley Iron Co.	24	Pike Mfg. Co.	76	Smith & Egge Mfg. Co.	100	Watson & Stillman.	48
Main Belting Co.	41	Pilling & Crane.	19	Smith, H. D. & Co.	105	Webster, Warren & Co.	34
Malin & Co.	9	Piqua Handle & Mfg. Co.	81	Smith, J. D. Foundry Supply Co.	28	Wells Bros. & Co.	51
Manning, Maxwell & Moore.	52	Pittsburgh Mfg. Co.	41	Smith, Theo. V.	89	Wells, Heber.	58
Manville Machine Co., E. J.	58	Pittsburgh Reduction Co.	66	Smith's Pattern Works.	28	Wernicke Co.	95
Maris & Beckley.	55	Place, Geo.	59	Smythe, S. R. Co., Inc.	28	Westwick, J. & Son.	33
Marlin, J. & Son.	39	Plumb, Fayette R.	78	Springfield Gas Engine Co.	31	Wetherell Bros.	20 & 23
Massey & Thompson.	85	Plume & Atwood Mfg. Co.	27	Standard Fdry. & Mfg. Co.	28	Wetherhill, Robt. & Co.	121
Matthiessen & Hegeler Zinc Co.	2	Phoenix Iron Co.	18	Smith, J. D. Foundry Supply Co.	28	White, A. A. & Co.	75
Mauler, Francis I.	64	Phosphor Bronze Smelting Co.	3	Smith, Theo. V.	89	White, L. & I. Co.	77
Maurer, H. & Son.	30	Pike Mfg. Co.	21	Smith's Pattern Works.	28	White, Mt. Freezer Co.	67
Mayhew, H. H. Co.	30	Place, Geo.	59	Smythe, S. R. Co., Inc.	28	White, Van Glahn & Co.	76
Merrill Bros.	2	Plumb, Fayette R.	78	Springfield Gas Engine Co.	31	Whiting Foundry Equipment Co.	29
Merrill Mfg. Co.	45	Plume & Atwood Mfg. Co.	27	Standard Fdry. & Mfg. Co.	28	Whitlock, Wm.	50
Merriman, A. H.	43	Poole, Robt. & Son Co.	38	Standard Horse Shoe Co.	103	Whitlock Coil Pipe Co.	36
Meyers, Fred J. Mfg. Co.	93	Pope Mfg. Co.	67	Standard Scale & Fixtures Co.	63b	Whitney, A. R. & Co.	21
Miles, F. S.	11	Pope Mfg. Co.	67	Standard Tool Co.	62	Whiton, D. S. Mch. Co.	50
Millar, C. & Son.	71	Popping, J.	58	Stanley Rule & Level Co.	121	Wickwire Bros.	7
Millbury Razor Co.	77	Port Chester Bolt & Nut Co.	113	Stanley Works.	106	Wilcox, Crittenden & Co.	27
Miller & Van Winkle.	122	Porter, H. K.	112	Star Brass Mfg. Co.	121	Wilcox & Howe Co.	105
Millers Falls Co.	68&122	Pottstown Iron Co.	21	Starrett, L. S.	71	Wiley & Russell Mfg. Co.	49&122
Millne, A. & Co.	21	Pottsville Iron & Steel Co.	18	Steam Gauge & Lantern Co.	90	Williamson, C. T. Wire Nov. Co.	86
Milton Mfg. Co.	112	Powell Planer Co.	47	Stearns, E. C. & Co.	66	Wilmot & Hobbs Mfg. Co.	1
Miner & Peck Mfg. Co.	47	Pratt & Cady Co.	121	Stephens & Co.	26	Wilson, E. H. & Co.	21
Wohr, J. J.	19	Prentiss, Geo. W. & Co.	4	Stephoe, J. & Co.	59	Wilson, John.	76
Monarch Cycle Co.	57	Prentiss Tool & Supply Co.	59	Sterling Emery Wheel Co.	56	Wilson, J. Fred.	114
Menoce, S. G.	58	Prentiss Vise Co.	70	Sternbergh, J. H. & Son.	118	Wilson, W. A.	47
Montour Iron & Steel Co.	24	Pullman Sash Balance Co.	77	Stevens, J. Arms & Tool Co.	74	Winslow, Sam'l, Skate Mfg. Co.	84
Moore, Dr. Gideon E.	66	Putnam Nail Co.	104	Stewart & Romaine Mfg. Co., Ltd.	113	Wire Fence Supply Co.	10
Moore Mfg. & Foundry Co.	55	Q. & C. Co.	45	Stewart Wire Co.	6	Wire Goods Co.	12
Moore & White Co.	58	Quint, A. D.	49	Stiles & Parker Press Co.	42	Wister, Francis.	19
Moorhead-McCleane Co.	23	Rainey, W. J.	1	Stirling Co.	37	Wister, L. & R. & Co.	24
Morgan Construction Co.	4	Randolph & Clowes.	1	Stocking, E. B.	6	Withington & Cooley Mfg. Co.	109
Morgan Spring Co.	4	Ranson Hardware Co.	71	Storm Mfg. Co.	70	Wohler Aluminum Co.	108
Morrison, Robert.	30	Reading Hardware Co.	99	Stover Mfg. Co.	101	Wolf, W. & L.	101
Morse Twist Drill & Machine Co.	52	Reading Wood Pulley Co.	53	Stow Flexible Shaft Co.	52	Wolf, R. H. & Co. Ltd.	5
Morse, Williams & Co.	55	Red Jacket Mfg. Co.	71	Stow Mfg. Co.	52	Wollensak, J. F.	70, 106 & 106
Morton, Thos.	106	Reeves, Paul S.	122	Streeter, N. R. & Co.	96	Wood, Alan & Co.	19
Moseley Iron Bridge & Roof Co.	10	Reeves Pulley Co.	56	Sturtevant, B. F. Co.	46	Wood, D. R. & Co.	26
Mount Carmel Bolt Co.	121	Republic Press.	38	Superior Steel Co.	5	Wood, W. Dewees Co.	23
Myers, F. E. & Bro.	70	Reynolds & Co.	14	Supplee Hardware Co.	111	Woodward & Rogers.	48
National Horse Nail Co.	105	R.I. Perkins Horse Shoe Co.	103	Swedish Razor Co.	79	Wooster, F. V.	94
National Pipe Bending Co.	36	Rhode Island Tool Co.	1	Sweetser, W. A.	12	Wurster, F. W. & Co.	122
National Saw Co.	72	Rhodes, L. E. Co.	58	Swindell, W. & Bros.	28	Wymar & Gordon.	107
National Structural Tubing Co.	17	Rice Mfg. Co.	28	Syracuse Smelting Works.	4	Yale & Towne Mfg. Co.	54&69
Newark Machine Tool Works.	66	Richardson, C. F. & Son.	69	Syracuse Twist Drill Co.	80	Zucker & Levett & Loeb Co.	31
New Britain Hardware Mfg. Co.	118	Richards, I. P.	121	Tablet & Ticket Co.	58		
New Castle Wire Nail Co.	11	Richmond Cedar Works.	96	Taintor Mfg. Co.	74		
New Haven Copper Co.	2	Ridgway, Craig & Son.	54	Talcott, W. O.	40		
New Haven Copper Co.	2	Rieleh Bros. Testing Machine Co.	40	Tanite Co.	122		

Published by DAVID WILLIAMS, 96-102
Reade Street, New York. Printed by
THE WILLIAMS PRINTING CO., General
Book, Commercial and News-
paper Printers and Binders, 96-102
Reade St., New York.

WHEN IN NEED Address MOUNT CARMEL BOLT CO.,
MOUNT CARMEL, CONN.



OUR AGENTS MAKE MONEY.



We Make
Wheels to Sell and
Stay Sold.

FIRST AND ONLY
IN THE WORLD TO MAKE

THE EAGLE BICYCLE MFG. CO.,
TORRINGTON, CONN.

ALUMINUM RIMS AND CLINCHER TIRES.

THE PRATT & CADY CO.,

MANUFACTURERS OF

IRON, BRASS, COMPOSITION AND BRONZE CASTINGS

Special facilities enable us to execute orders promptly. Prices reasonable for high grade work.

WILLIAM A. HARRIS, SELLING AGENT, - HARTFORD, CONN.

U. S. STANDARD Boxwood AND IVORY RULES.



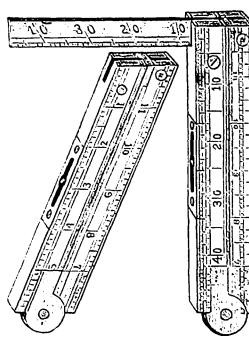
RIVERTON, CONN.,

and 80 Chambers St., New York.

WALWORTH MFG. CO., Boston, Mass.
STEAM, WATER, AND GAS GOODS IN ENDLESS VARIETY
SEND FOR CATALOGUE.

PLUMBERS' AND FITTERS' TOOLS AND SUPPLIES.

Tools for cutting and threading Wrought Iron Pipe, Die Plates and Dies, Stillson Pipe Wrench, Miller's Ratchet Die Plate. Brass and Iron Valves and Cocks, Wrought Iron Pipe and general Machinists' Supplies.



THE ART OF SELLING.

By F. B. GODDARD.

12mo, Flexible Cloth, 50 Cents.

In this book the author lets the reader into the secrets of the accomplished and successful salesman, illustrates his tact and finesse, and tells how he masters men: but beyond this, the work embraces much information which will be instructive and useful to all classes of business men. Besides suggestions to buyers, it contains chapters on "Changes in Business Conditions and Methods," "Salesmen's Compensation," "Retail Merchants and Salesmen," "Saleswomen," "How to Read Character," with a collection of clearly and tersely put important Legal Principles and Decisions Governing Sales. Sent, post-paid, upon receipt of price, by

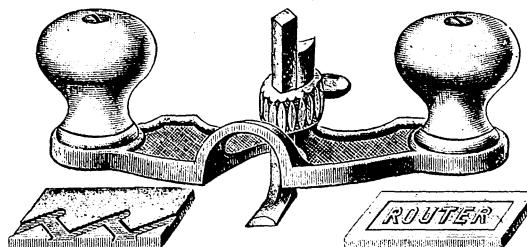
DAVID WILLIAMS, Publisher & Bookseller, 96-102 Reade St., N. Y.

IMPROVED
Labor-Saving
CARPENTERS'
TOOLS.

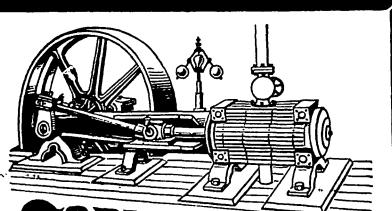
STANLEY
RULE & LEVEL CO.
New Britain, Conn.

SOLD BY ALL
Hardware Dealers.

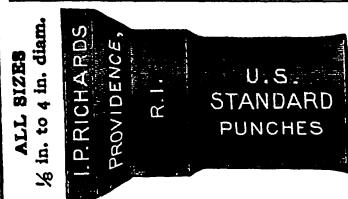
Woodworker's Handy Router Plane.



This Tool will smooth the bottom of grooves, panels, or all depressions below the general surface of any wood-work; and will rapidly router out mortises for Sash-frame Pulleys, etc. No. 71. Iron Stock, with Steel Bits (1/4 and 1/2 inch).....\$1.50



CORLISS ENGINES
MACHINISTS
IRON FOUNDERS, BOILER MAKERS.
ROBT. WETHERILL & CO.
CHESTER, PA.



For Punching
IRON AND STEEL.

Star Non-Corrosive Steam Gages,

"POP" SAFETY VALVES,
Steam Engine and Boiler Apparatus in General.
Highest grade only. Send for Catalogue and Steam Users' Manual.
Star Brass Mfg. Co.
37 Lancaster St., Boston, Mass.

THE ENGLISH AND AMERICAN
MECHANIC:

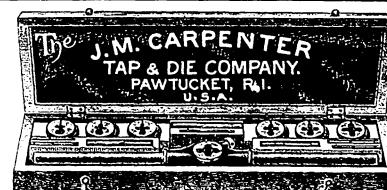
An Every-day Hand-Book for the Workshop
and the Factory.

CONTAINING
SEVERAL THOUSAND RECEIPTS, RULES AND TABLES INDISPENSABLE TO THE MECHANIC, THE ARTIST AND THE MANUFACTURER.

By VAN CLEVE and EDWARDS.
500 Pages, Cloth, \$2.00.

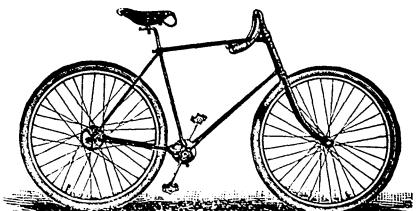
Sent, postpaid, upon receipt of price, by

DAVID WILLIAMS, 96-102 Reade St. N.Y.

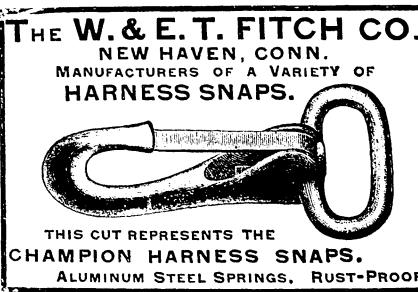


A SATISFIED CUSTOMER

is the best advertisement. This is the way they talk when asked how they like



THE LEAGUE CHAINLESS
after a 10-mile ride over hills and muddy roads: "If I was buying 50 bicycles 49 of them would be the League Chainless, and the 50th a chain machine for a relic!" This simply voices the opinions of thousands of others who have ridden the League Chainless. THE LEAGUE CYCLE CO., Hartford, Ct.



THE W. & E. T. FITCH CO.
NEW HAVEN, CONN.
MANUFACTURERS OF A VARIETY OF
HARNESS SNAPS.

THIS CUT REPRESENTS THE
CHAMPION HARNESS SNAPS.
ALUMINUM STEEL SPRINGS, RUST-PROOF.

PAUL S. REEVES,

Philadelphia.

Phosphor Bronze

AND

BABBITT METALS.

Lead Lined Car Bearings a Specialty.

Brass and Phosphor Bronze Castings from $\frac{1}{4}$ pound to 20,000 pounds in weight.

Emery Emery Wheels, Grinding Machines, Grinders' Supplies.... Quick process and large stock.

WHEN IN A HURRY ORDER OF

The Tanite Co., Stroudsburg, Monroe Co., Pa., U. S. A.
New York, 161 Washington Street.
Cincinnati, 1 West Pearl Street.
London, Eng., Thos. Hamilton, 90 Cannon St., E. C.



BICYCLE SPOKES
OF EVERY DESCRIPTION.

Tube Tapering Machines.

EXCELSIOR NEEDLE CO.,
TORRINGTON, CONN.

BOMMER COMPOUND SPRING

HINGES Are the Best.

Utility, Durability and Beauty Combined.

IT PAYS TO SELL THEM.

BOMMER BROS.,

351 & 353 Jay St., Brooklyn, N.Y.

STANLEY & FLAGG & CO., Philadelphia, Pa.

Office and Works, N. W. Cor. 19th St. & Pennsylvania Ave.

Manufacturers of **STEEL CASTINGS**,

A Substitute for Steel and Wrought Forgings.

Circulars Sent on Application.

HOLIDAY GOODS.**See Page 68.****MILLERS FALLS CO.**,
93 Reade St., New York.**EUREKA CAST STEEL COMPANY.**

Office and Works, Chester, Pa.

Open Hearth, Crucible and Eureka Steel Castings.

Railroad and Machine Castings.

Locomotive Cross-Heads and Gearing a Specialty.

Guaranteed Knuckles for M. C. B. Couplers.

SPRINGS AND AXLES
ROLLING MILL.
F. W. WURSTER & CO.
375 Kent Ave. Brooklyn, N.Y.



Made by WILEY & RUSSELL MFG. CO.,
Send for New Catalogue. Greenfield, Mass.

LIDGERWOOD
HOISTING ENGINES.

300 styles and sizes. Over 10,000 in use.

LIDGERWOOD MFG. CO., 96 Liberty St., N.Y.

ESTABLISHED
Spring Making, 1842. Steel Making, 1845.
Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,MANUFACTURERS OF
Springs, Steel, Re-Rolled Norway

Iron & Slit Norway Nail Rods.

Address FRANKFORD P. O., PHILADELPHIA.

A. G. PECK & CO.

Cohoes, N. Y.

MANUFACTURERS OF

AXES, ADZES,
BROAD AXES,
HATCHETS.Send for Catalogue
and Price List.**NOTICE TO MFRS.**

If you wish anything in the

WOOD TURNING LINE,Send sample per mail for
estimate to**JOHN SOMMER'S SON,**
355-365 Central Ave., Newark, N.J.**RUSSELL, BURDSALL & WARD,**

Portchester, N. Y.,

Manufacturers of

Carriage, Tire, Plow and Stove

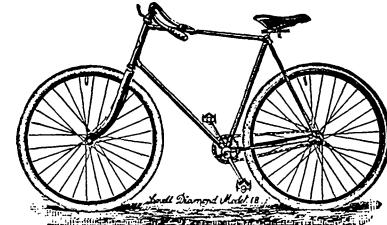
BOLTS

Carriage Bolts made from Best Square Iron a Specialty.

More Artistic
than cast iron; better; stronger.
BRADLEY STEEL SHELF BRACKET.
Sells at a lower price. Pays a larger profit. Send for circular.

Atlas Mfg. Co.,
New Haven, Ct.

PAT. NOV. 8, 1882.

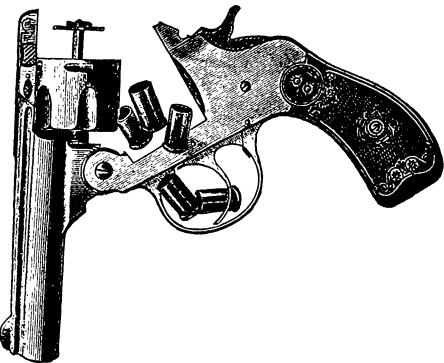
WANTEDWide-awake agents to sell the most popular, largest seller and best **BICYCLE** made,**THE LOVELL DIAMOND.**

Liberal terms. Send for Catalogue and Prices.

LATEST AND BEST,

JOHNSON

AUTOMATIC REVOLVER.



Send for our new catalogue of specialties.

JOHN P. LOVELL ARMS CO.,

Manufacturers and Jobbers in

Fire Arms, Bicycles and Sporting Goods,
BOSTON, MASS.

GEM
SPRING
HINGES

FOR DOORS,		JAPANNED.	
Feet.	Inch.	Length of Flange.	Single Acting
6x2	$\frac{3}{4}$ to $1\frac{1}{2}$	3 $\frac{1}{2}$ in	63 83
7x2	1 to $1\frac{1}{2}$	4 in	64 84
7x3 $\frac{1}{2}$	1 to $1\frac{1}{2}$	5 in	65 85
7x2 $\frac{1}{2}$	1 to $1\frac{1}{2}$	6 in	66 86
8x2 $\frac{1}{2}$	$1\frac{1}{4}$ to $1\frac{1}{2}$	7 in	67 87
8x3	$1\frac{1}{2}$ to $2\frac{1}{2}$	8 in	68 88
9x3	$1\frac{1}{2}$ to $2\frac{1}{2}$	10 in	69 89

For SCREEN, MEDIUM AND HEAVY DOORS.

Single and Double Acting.

THE 3 $\frac{1}{2}$ AND 4 INCH
ARE THE BEST IN
THE MARKET FOR
SCREEN DOORS.



Send for full Catalogue of Bronzed, Brass and
Bronze Metal Spring Hinges.

MANUFACTURED BY

Van Wagoner & Williams Hardware Co.,
CLEVELAND, O., and 14 WARREN ST., N.Y.

THE IRON AGE

THURSDAY, NOVEMBER 1, 1894.

The Morgan 1000-Ton Forging Press.

Although the steam hammer and hydraulic press have for many years

largely incidental to the rise and development of the American armor plate industry. The exceptionally large hammer and powerful presses built by John Fritz for the Bethlehem Iron Company and the installation of the Whitworth

work. Our illustration, Fig. 1, gives a good view of a 1000-ton hydraulic press to be erected by Wyman & Gordon of Worcester, Mass., and designed and built for them by the Morgan Construction Company of that city. It is

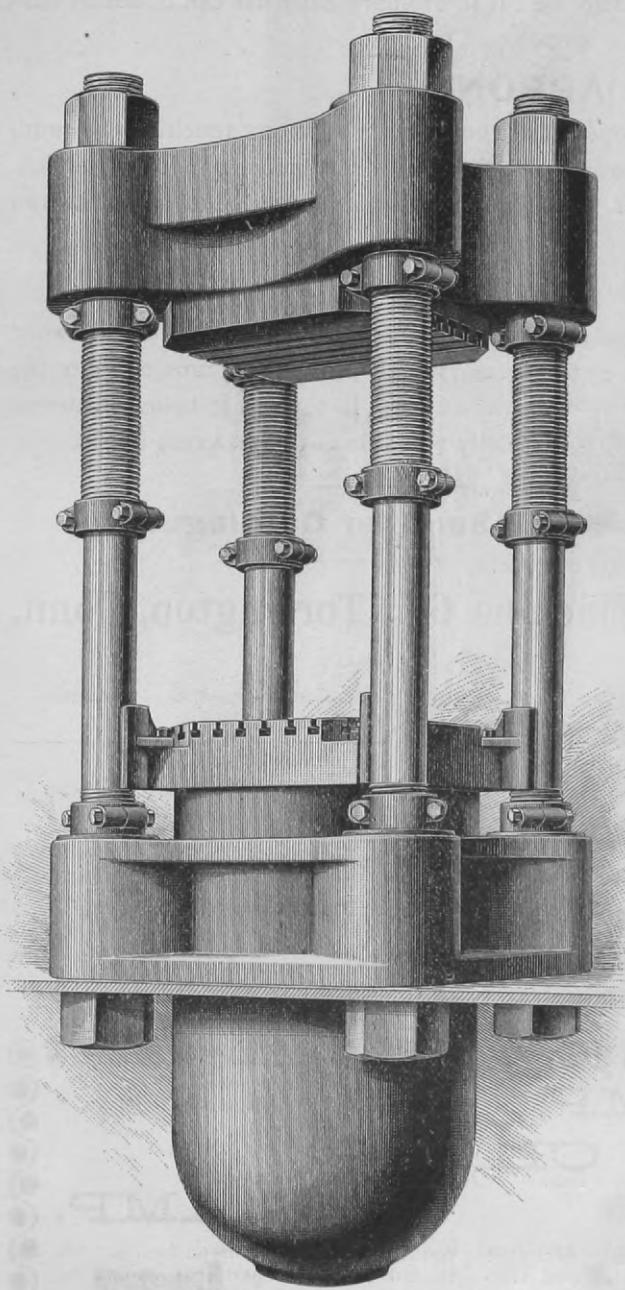


Fig. 1.—General Elevation.

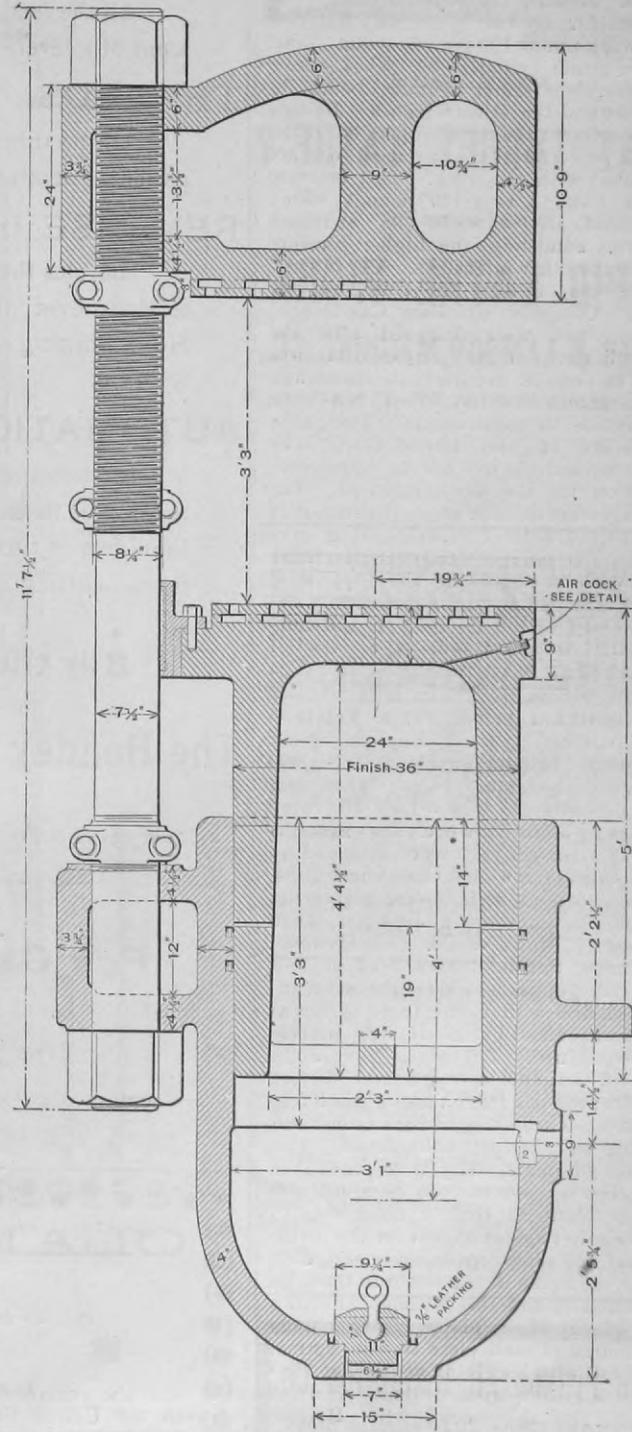


Fig. 2.—Section.

THE MORGAN 1000-TON FORGING PRESS.

been employed in the manufacture of forgings, it is only within a comparatively short time that their relative merits and capabilities have become widely known and preferences for or against them overcome by actual and conclusive demonstration. This has been

press at the Carnegie works have all served to arrest and hold the attention of engineers and manufacturers as to the peculiarities of each. The adaptability of the press to the manufacture of miscellaneous forgings is inducing some manufacturers to adopt it for such

for use on special die forgings. Fig. 2 shows a section, on the left of the center line of the drawing, through the guide rod to the center, while that part on the right of the center line of the engraving shows one-half of a longitudinal section through the body of the top

and plunger. The cylinder is a Midvale steel casting weighing 16,594 pounds. Tensile strength test showed 92,350 pounds, with an extension of 21.2 per cent., and a contraction of area of 30.85 per cent. The cylinder is 36 inches diameter and works under pressure of 1 ton per square inch, yielding a pressure of 1000 tons.

Pressure is supplied by means of so called intensifiers, these being adopted in preference to accumulators, as the shock in overcoming the momentum of the latter in connection with such high pressures is objectionable. The intensifiers are two in number, designed to work under 100 pounds steam. Both have steam cylinders 32 inches, 4-foot stroke, one water cylinder being 22 inches and the other 6 inches. By this arrangement the press is operated by the least powerful of the two until contact is made with the work. The pressure then rises to, say, 100 pounds, which automatically operates an auxiliary valve, admitting the higher pressure from the other intensifier. The intensifiers were built by the Geo. F. Blake Mfg. Company of East Cambridge, Mass., and were designed after the specifications of the Morgan company.

The press is massively proportioned throughout and no effort has been spared in its construction. The guide rods are of best forged steel. The plunger and the top are in ample proportion for the work required. The plunger has double rings, that one may hold should its companion ring give out. The plunger can readily be taken out without disturbing the top, and it is so arranged as to be practically self contained within the cylinder and independent of guide rods at any part of the stroke.

The Okhta Armor Plate Trials.—The contest between English armor plates and Russian guns and shells was renewed on October 14 at Okhta, near St. Petersburg. The 6 inch Harveyed plates by John Brown & Co. and the Vickers respectively were attacked by the 45 caliber 6 inch Oboukhoff guns. The conditions, so far, were practically much the same as in July last, when plates by Brown & Co. and Cammell & Co. of Sheffield were fired at, and the result appears to leave the last mentioned firm still to the front as far as plates hardened by the Harvey process are concerned. The plate from John Brown on this occasion was 6 feet square; the one from Vickers was 8 feet square. The former had one corner and a strip all round left unhardened. The object of this novelty is to prove that the Harvey process can be applied to armor plates in such a manner as to leave softer spaces at will for the drilling of holes for torpedo net booms, &c., after the fixing of the armor to the sides of the ship, and this without affecting the quality of the plates. Two rounds were fired at each plate in the normal position with a striking velocity of 1889 feet, the first with ordinary Holtzer shells, and the second with Holtzer shells improved by the secret "magnetic" appliance of Admiral Makaroff, both kinds being manufactured at the Putilof works. All the shots passed through the plates. The plate from Brown & Co. cracked considerably at the first round; the second shot produced no cracks. The first shell fired at Vickers' plate passed through it and the backing unharmed; the other was broken up in or behind the backing. Vickers' plate was then turned to an angle of 15°, and with the same velocity one round was fired at it with the

"magnetic" shell, which broke up in the backing, perforating and cracking the plate severely. The experiments will be continued.

Since the close of the World's Columbian Exposition there has been connected with the Imperial German Consulate in Chicago a commercial department, the purpose of which is to

commercial and technical information which is given free of charge to any American or German firm interested in importation to or exportation from Germany. Its work is limited to collecting and distributing information, and it does not undertake to close business transactions of any kind, nor will it interfere with any business relations already existing between firms of both

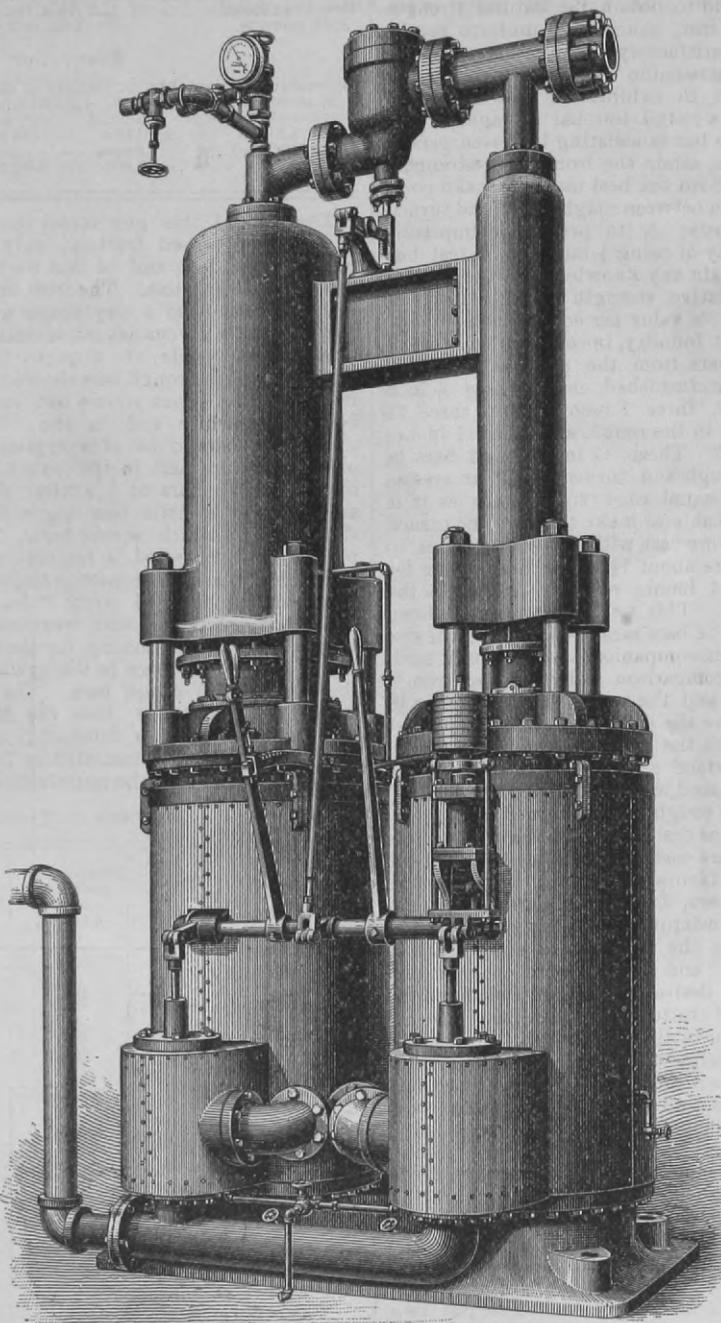


Fig. 3.—Blake Intensifier for Morgan 1000-Ton Press.

stimulate the commercial exchange between the United States and Germany; to facilitate the intercourse between buyers and sellers of merchandise of all kinds—raw material, victuals, machinery, apparatus and instruments, objects of art, &c., of America and Germany; to keep both sides posted on the subject of duties, currency, rules for importation and exportation, &c., and to give information about new inventions, patents and new processes of manufacture, and how they can be utilized. Thus, this department is not an agency for a certain number of private firms, but a bureau of general

countries. All communications intended for the department should be addressed to the Imperial German Consulate, Commercial Department, 120-122 East Randolph street, Chicago, Ill.

A sign of reviving business activity is seen in the fact that the American Bell Telephone Company during the month ending October 20 added 3346 instruments to their outstanding number, making the total now under rental in the United States 578,569. The entire increase during the 12 months ending on the date referred to is only 6591.

Comparison of Strength in Specialty Mixtures of Cast Iron *

BY THOS. D. WEST.

The writer's objects in presenting this series of tests are: 1, To illustrate the fact that by casting test bars on end we are using the best possible method to obtain the natural strength of an iron, hence more uniform results and satisfactory comparisons, that are not attainable by casting test bars flat; 2, to exhibit the desirability of using a round test bar as against the square bar in assisting to lessen erratic results, attain the iron's best strength, and afford the best means to make comparison between rough round and turned test bars; 3, to prove the impracticability of using $\frac{1}{2}$ -inch square test bar to obtain any knowledge of the natural or relative strength of cast iron, or figure its value per square inch.

Each foundry, in casting a set of these test bars from the patterns which the writer furnished, made three $\frac{1}{2}$ -inch square, three 1 inch square, three $1\frac{1}{2}$ inches in the rough, and three $1\frac{1}{2}$ inches turned. These $1\frac{1}{2}$ -inch round bars in the rough and turned are of an area as nearly equal to 1 square inch as it is practicable to make them. The turned bars were cast with a swell on so as to measure about $1\frac{1}{2}$ inches in diameter for about 4 inches of their length in the center. This swell was turned down until the bars measured close to the size of their companion $1\frac{1}{2}$ -inch rough bars. The comparison between the rough round and the turned bar enables us to perceive the difference that may exist between the strength of the iron with its surface affected by the walls of a green sand mold and that of iron having its rough surface turned off.

It was first planned to have all these test bars cast on end, so as to afford the most favorable conditions to insure solid bars, &c., but in starting with car wheel mixtures, difficulty was found in getting the $\frac{1}{2}$ -inch square test bars to "run," and as there were other strong irons I desired tests from, I changed the plan of casting and had all bars cast flat with an incline of 2 inches, the pouring gate being the high end. The three test bars from each of the four sizes were cast all in one flask, poured from the same gate and out of the same ladle. Each test bar has two wires cast into it 1 foot apart in order to measure contraction and to act as guides in placing downward the same side in testing.

All the bars were cast 15 inches long and in breaking them for transverse strength they rested on pointed supports 12 inches centers. The last two columns in the tables give the strength per square inch. The outside column is used only for the $\frac{1}{2}$ -inch square bars so as to illustrate two methods of figuring. 1.1284 inches is equal to the area of 1 inch square. By keeping this in mind the figures in the micrometer columns can have their relation to a square inch readily defined. In order that the reader may quickly define and understand how strength per square inch was obtained for the accompanying tables we give two examples below, as one method is necessary for a square bar and another for a round bar.

The first series of tests we will present is that recording the strongest mixture; the second, the next best in strength, and so on, the last table being the weakest iron. The remarks under the heading, "State of fracture," imply

"slight" to mean just noticeable; "small," plainly visible; "bad," a serious flaw, and "large" or "huge," of a character a third as large at least as the area of the test bar.

Olsen testing machine which the writer used for testing the above bars from the Builders' Iron Foundry, and also those from heavy machinery shown in Table IV.

Square Bar. Test No. 6. Table I.

Micrometer Measure.	Square.	Area of bar.
1.002 inches x 1.002 inches	=	1.004 square inches.
Breaking load. 3,500 pounds.	Area. +	1.004 = 3,486 pounds strength per square inch.

Round Bar. Test No. 12. Table I.

Diameter.	Diameter	Square of diameter.
1.132 inches	x 1.132 inches	= 1.281424 square inches.
Square of diameter.	Decimal.	Area.
1.281424	x 0.7854	= 1.006 square inches.

Breaking load. 3,708 Area. + 1.006 = 3,688 pounds strength per square inch.

The tests of this gun metal showed an excellent sound fracture, only one bar having a flaw, and of that we have not recorded any test. The iron in the planed bars showed a very coarse grain partaking of a fibrous nature, something after a good grade of wrought iron. The metal of the rough bars showed the fracture in the $\frac{1}{2}$ -inch square test bar to be strictly white and in the 1-inch square test bars to be of a crystalline mottled nature and in the rough $1\frac{1}{2}$ -inch diameter bars of a similar character, but to a little less degree than shown in the 1-inch square bars. The planed bars presented a fracture of a dark colored, close, compact grain, as of a very strong iron. I wrote Robt. A. Robertson, secretary and treasurer of the Builders' Iron Foundry, for the reason of such a difference in the grain of the planed and rough bars. He answered, in substance, that the large open grained bars, or those of Nos. 3, 4, 5, 9, 10 and 11, illustrated in Table I, were planed from the muzzle disk of

Remarks by J. B. Nau: The iron in all the tests showed very good qualities and was very strong, but the heavy flaws and blow holes formed in this class of iron when cast in small pieces greatly impair the strength. In heavy castings like rolls these defects will not happen and show the iron to be of superior quality.

Remarks by the writer: If the above bars could have been cast on end, there would no doubt have been much less occasion for referring to blow holes. A few of the sound looking pieces were selected by the writer after having been broken for transverse strength and shipped back to Mr. Nau, to be pulled for the tensile strength. No. 15 of the $\frac{1}{2}$ -inch bars pulled 6100 pounds, exhibiting a slight flaw. No. 17 of the 1-inch square pulled 23,700 pounds with a slight flaw. No. 21 of the $1\frac{1}{2}$ -inch diameter rough bars pulled 30,100 pounds, also showing a slight flaw. The iron in the $\frac{1}{2}$ -inch bars showed a white crystalline fracture, likewise the 1-inch

Table I.—Transverse Tests of Gun Metal.

No. Test.	Common rule measurement.	Micrometer measurement. Inches.	Deflection. Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
1	Rough bars.					
1	$\frac{1}{2}$ inch square.....	0.491	0.120	376	Sound.	1,560
2	$\frac{1}{2}$ inch square.....	0.501	0.115	420	Sound.	1,673
3	Planed bars.					
3	$\frac{1}{2}$ inch square.....	0.491	0.250	384	Sound.	1,593
4	$\frac{1}{2}$ inch square.....	0.495	0.270	360	Sound.	1,469
5	$\frac{1}{2}$ inch square.....	0.494	0.200	316	Sound.	1,295
6	Rough bars.					
6	1 inch square.....	1.002	0.090	3,500	Sound.	3,486
7	1 inch square.....	0.996	0.085	3,380	Sound.	3,400
8	1 inch square.....	1.044	0.095	3,428	Sound.	3,145
	Planed bars.					
9	1 inch square.....	1.007	0.130	3,140	Sound.	3,096
10	1 inch square.....	1.005	0.120	3,095	Sound.	3,064
11	1 inch square.....	1.005	0.110	3,072	Sound.	3,042
	Rough bars.					
12	$1\frac{1}{2}$ inches diameter.	1.132	0.125	3,708	Sound.	3,686
13	Turned bars.					
	$1\frac{1}{2}$ inches diameter.	1.139	0.150	3,320	Sound.	3,258

Test bars furnished by Builders' Iron Foundry, Providence, R. I. Tested by Thomas D. West, at the works of the T. D. West Foundry Company, Sharpsville, Pa., September 18, 1894. Witnesses: Geo. H. Boyd and G. M. McIlvain.

a 12 inch mortar casting, and bars 1, 2, 6, 7, 8, 12 and 13 were cast with metal which was used to pour a lower base ring for a 12-inch spring return mortar carriage. Mr. Robertson further said the charge of iron for the mortar was very much harder than that used for the base ring, but as it was cast in a very large mass and cooled very slowly it is not surprising that the fracture shows the iron in the mortar body to be much softer (or open grained) than that in the test bars from the base ring. Mr. Robertson says the tensile strength of the four specimens taken for acceptance of the 12-inch return mortar or lower base casting as above described was as follows:

No. 1, 37,100 pounds. No. 3, 36,000 pounds. No. 2, 37,000 pounds. No. 4, 32,800 pounds.

It might be well to state that it was an

square. The $1\frac{1}{2}$ -inch diameter rough bars showed a very close knit grain tending to a light color. The $1\frac{1}{2}$ -inch turned bars are also very close grained, a little darker in color than the $1\frac{1}{2}$ -inch bars, but both of the latter exhibit to an expert the appearance of great strength, as being of exceptionally strong metal.

The iron in the $\frac{1}{2}$ -inch bars is white and crystalline. In the 1 inch square bar the iron is mottled, tending to white. In the $1\frac{1}{2}$ -inch round rough bars the metal is more evenly mottled and less white than in the 1-inch square. The $1\frac{1}{2}$ inch round turned bars show a very rich dark gray color, and, as can be seen by No. 36, the turned bar stood the greatest load per square inch of any in this table. While this iron cannot be expected to stand near the load of a chill roll mixture, still we find No. 36

* Read before the Western Foundrymen's Association, October 24, 1894.

is of nearly the same strength as the and 25, but for these latter two not strongest chill roll test seen as Nos. 22 showing greater strength some allow-

Table II.—Transverse Tests of Chill Roll Iron.

No. Test.	Common rule measurement.	Micrometer measurement. Inches.	Deflection. Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
14	Rough bars.					
14	1/4 inch square....	0.514	0.100	180	Small flaw.	682
15	1/4 inch square....	0.509	0.120	230	Sound.	1,340
16	1/4 inch square....	0.518	0.150	300	Sound.	1,119
17	Rough bars.					
17	1 inch square....	1.024	0.120	2,130	Small flaw.	2,032
18	1 inch square....	1.032	0.120	2,590	Slight flaw.	2,432
19	1 inch square....	1.029	0.111	1,795	Bad flaw.	1,697
20	Rough bars.					
20	1 1/8 inches diameter..	1.130	0.100	2,230	Small flaw.	2,215
21	1 1/8 inches diameter..	1.118	0.090	1,745	Bad flaw.	1,777
22	1 1/8 inches diameter..	1.140	0.150	3,040	Slight flaw.	2,980
23	Turned bars.					
23	1 1/8 inches diameter..	1.124	0.090	935	Bad flaw.	943
24	1 1/8 inches diameter..	1.126	0.050	95	Huge flaw.	95
25	1 1/8 inches diameter..	1.124	0.190	3,020	Slight flaw.	3,044

Test bars furnished by Lewis Foundry & Machine Company, Pittsburgh, Pa. Tested at the works of McConway & Torley, Pittsburgh, Pa., June 27, 1894, by J. B. Nau of Allegheny, Pa. Witnessed by R. G. G. Moldenke.

Table III.—Transverse Tests of Car Wheel Iron.

No. test.	Common rule measurement.	Micrometer measurement. Inches.	Deflection. Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
26	Rough bars.					
26	1/4 inch square....	0.474	0.090	273	Sound.	1,213
27	1/4 inch square....	0.496	0.090	280	Sound.	1,138
28	1/4 inch square....	0.491	0.090	278	Sound.	1,158
29	Rough bars.					
29	1 inch square....	1.012	0.075	2,535	Sound.	2,476
30	1 inch square....	1.022	0.074	2,415	Sound.	2,313
31	1 inch square....	1.007	0.075	2,294	Sound.	2,262
32	Rough bars.					
32	1 1/8 inches diameter..	1.090	0.111	2,340	Sound.	2,508
33	1 1/8 inches diameter..	1.072	0.100	2,360	Sound.	2,615
34	1 1/8 inches diameter..	1.135	0.100	2,568	Sound.	2,588
35	Turned bars.					
35	1 1/8 inches diameter..	1.151	0.110	2,000	Small flaw.	1,922
36	1 1/8 inches diameter..	1.174	0.170	3,050	Sound.	2,819
37	1 1/8 inches diameter..	1.183	0.100	1,650	Bad flaw.	1,501

Test bars furnished by A. Whitney & Sons, Philadelphia, Pa. Tested by John R. Matlock, Jr., at the works of Riehle Bros. Testing Machine Company, Philadelphia, Pa., June 27, 1894. Witness: W. C. Cutler.

Table IV.—Transverse Tests of Heavy Machinery Iron.

No. test.	Common rule measurement.	Micrometer measurement. Inches.	Deflection. Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
38	Rough bars.					
38	1/2 inch square....	0.504	0.195	380	Sound.	1,496
39	1/2 inch square....	0.503	0.220	432	Sound.	1,707
40	1/2 inch square....	0.504	0.185	372	Sound.	1,485
41	Rough bars.					
41	1 inch square....	1.004	0.100	2,464	Sound.	2,444
42	1 inch square....	1.009	0.090	2,510	Sound.	2,465
43	1 inch square....	1.007	0.100	2,649	Sound.	2,604
44	Rough bars.					
44	1 1/8 inches diameter..	1.187	0.100	2,786	Sound.	2,745
45	1 1/8 inches diameter..	1.185	0.120	2,824	Sound.	2,791
46	1 1/8 inches diameter..	1.143	0.100	2,50	Slight flaw.	2,437
47	Turned bars.					
47	1 1/8 inches diameter..	1.125	0.120	2,257	Sound.	2,271
48	1 1/8 inches diameter..	1.125	0.150	2,488	Sound.	2,503
49	1 1/8 inches diameter..	1.124	0.140	2,344	Sound.	2,363

Test bars furnished by the Walker Mfg. Company of Cleveland, Ohio. Tested by Thomas D. West, at the T. D. West Foundry Company, September 18, 1894. Witnesses: Geo. H. Boyd and G. M. McIlvain.

Table V.—Transverse Tests of Light Machinery Iron.

No. Test.	Common rule measurement.	Micrometer measurement. Inches.	Deflection. Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
50	Rough bars.					
50	1/2 inch square....	0.499	0.20	454	Slight flaw.	1,823
51	1/2 inch square....	0.505	0.210	250	Small flaw.	980
52	1/2 inch square....	0.502	0.110	90	Big flaw.	357
53	Rough bars.					
53	1 inch square....	1.016	0.130	1,710	Slight flaw.	1,657
54	1 inch square....	1.021	0.125	1,780	Slight flaw.	1,688
55	1 inch square....	1.008	0.115	1,800	Slight flaw.	1,771
56	Rough bars.					
56	1 1/8 inches diameter..	1.146	0.160	1,795	Sound.	1,741
57	1 1/8 inches diameter..	1.156	0.180	2,220	Sound.	2,115
58	1 1/8 inches diameter..	1.141	0.180	1,980	Slight flaw.	1,928
59	Turned bars.					
59	1 1/8 inches diameter..	1.162	0.200	1,705	Sound.	1,609
60	1 1/8 inches diameter..	1.160	0.210	720	Sound.	1,628
61	1 1/8 inches diameter..	1.175	0.210	1,775	Sound.	1,637

Test bars furnished by Taylor, Wilson & Co., Ltd., Allegheny, Pa. Tested by J. B. Nau, at the works of McConway & Torley, June 19, 1894. Witness: R. G. G. Moldenke.

ance must be made on account of the small flaws their fracture exhibited. Bar No. 33 pulled tensile 23,270. This wheel mixture proves to be an excellent iron for strength.

The iron in the 1/4-inch square test bars of which No. 39 is a sample presents a very close compact grain tending to white and would be difficult to drill. The 1-inch square bars could be drilled fairly well and show a close dense fracture. The 1 1/8-inch round bars present more of a dark gray color than the 1-inch square bars and are much more easily drilled. The turned bars show a fine, rich colored compact iron such as would stand exceptional wear and resistance to fracture. Bar No. 43 pulled 26,160 pounds, and No. 44, 18,670, exhibiting a slight flaw. For medium to heavy machinery this metal should make a most serviceable casting.

The fracture of this set of test bars shows an exceptionally good iron for light work. The tests record above the average for soft iron as regards strength. The color is a rich gray, devoid of that silver look many castings display that are desired to be of a soft quality. The 1/4-inch bars are the closest grained, the 1-inch square the next in order, then comes the 1 1/8 inch in the rough, followed by the turned 1 1/8-inch bars, which are the most open grained, rich in color and graphite. A few of these bars were pulled for the tensile strength. The strongest 1/4-inch bar, No. 50, stood 6000 pounds. The next in strength to this, No. 51, stood 5,950 pounds. The 1-inch square bar, No. 54, stood a pull of 19,000 pounds, and No. 53 broke at 17,500 pounds. The 1 1/8-inch diameter rough bar, No. 56, stood 19,900 pounds. No. 58, also a rough round bar, separated at 21,120 pounds. All these tensile pulled bars were sound excepting No. 54, which had a slight flaw.

The test of the inch square and round bars would assert this iron to be of good strength for the work intended. A factor in this series which will no doubt attract attention is the light load the 1/4-inch bar stood in comparison with the larger sizes and only goes to further demonstrate the erratic and deceptive results which we may expect with 1/4-inch test bars. Tests taken of this iron from the bars broken for transverse strength to obtain knowledge of the tensile qualities compared very closely to those of Table V, as the 1/4-inch bar, No. 54, stood 6000 pounds and bar No. 62 pulled 4350 pounds. The 1-inch square bar, No. 66, stood 16,600 pounds and No. 65 broke at 15,900 pounds. The 1 1/8-inch round rough bar No. 69 took 12,600 pounds to fracture it, and No. 78 of the turned bars stood 17,150 pounds. All these tensile pulled bars are of perfect solid fracture, excepting Nos. 65 and 69, which exhibit small flaws.

The first factor which with many will attract the attention in this table is that of the 1/4-inch bars Nos. 74 and 76, which had a small flaw in them, standing more of a load than bar No. 75, which was sound. The only reason the writer could ascribe for such effect is that the flaws being in the middle of the 1/4-inch bars must have acted upon the principle of a hollow column being stronger than if a solid body.

Another factor to impress one in studying these tests is the uniformity of the load the bars stood and also the weight necessary to break them, for as a general thing "white iron" exhibits little strength in castings. The deduction to be drawn from these tests is in the evils emanating from excessive contraction, which is characteristic of white-

iron. Many castings made of white iron have been known to fly to pieces from internal contraction strains when cooling without a jar or the least weight being placed upon them. The above tests would lead us to decide that the greatest weakening element in castings

prove. The first in the tables being the $\frac{1}{4}$ -inch square ones, we will discuss the practicability of adopting such a size as a standard to obtain the relative strength of cast iron. It will require but little study of the tables to find that it does not record any practical varia-

Table VI.—Transverse Tests of Stove Plate Iron.

No. Test.	Common rule measurement.	Micrometer measurement, Inches.	Deflection, Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
62	Rough bars.					
63	$\frac{1}{4}$ inch square.....	0.475	0.220	160	Sound.	711 1,280
64	$\frac{1}{2}$ inch square.....	0.476	0.260	170	Sound.	747 1,360
65	$\frac{1}{2}$ inch square.....	0.474	0.250	160	Sound.	689 1,200
66	Rough bars.					
67	1 inch square.....	0.977	0.110	1,275	Bad flaw.	1,336
68	1 inch square.....	0.994	0.150	1,767	Sound.	1,778
69	1 inch square.....	0.975	0.160	1,060	Sound.	1,747
70	Rough bars.					
71	$1\frac{1}{2}$ inches diameter..	1.118	0.170	1,780	Sound.	1,813
72	$1\frac{1}{2}$ inches diameter..	1.127	0.180	1,070	Bad flaw.	1,073
73	$1\frac{1}{2}$ inches diameter..	1.126	0.170	1,775	Sound.	1,783
74	Turned bars.					
75	$1\frac{1}{2}$ inches diameter..	1.127	0.180	1,320	Slight flaw.	1,322
76	$1\frac{1}{2}$ inches diameter..	1.140	0.180	1,440	Sound.	1,412
77	$1\frac{1}{2}$ inches diameter..	1.125	0.180	1,335	Sound.	1,343

Test bars furnished by Bissell & Co., Allegheny, Pa. Tested by J. B. Nau, at the works of Conway & Torley, June 20, 1894. Witness: R. G. G. Moldenke.

made of "white iron" is due to excessive contraction. The reason for not showing any turned bars in this test is due to the difficulty, or rather the impracticability, of machining such a hard metal. The test bars are exceptionally solid that are noted as being free of flaws. Bar No. 82 pulled 7125 pounds.

tion in degrees of strength, no matter what quality of iron is used. It asserts that gun metal, chill roll, car wheel and heavy machinery are no stronger than light machinery, stove plate or sash weight irons. Any one experienced in the handling or use of cast iron knows that the first four qualities of iron are

Table VII.—Transverse Tests of Sash Weight or White Iron.

No. Test.	Common rule measurement.	Micrometer measurement, Inches.	Deflection, Inches.	Broke at, in pounds.	State of fracture.	Strength per square inch, in pounds.
74	Rough bars.					
75	$\frac{1}{2}$ inch square.....	0.488	0.082	175	Small flaw.	735 1,400
76	$\frac{1}{2}$ inch square.....	0.484	0.060	160	Sound.	683 1,280
77	$\frac{1}{2}$ inch square.....	0.487	0.062	170	Small flaw.	717 1,360
78	Rough bars.					
79	1 inch square.....	0.992	0.050	1,340	Small flaw.	1,361
80	1 inch square.....	0.994	0.040	1,325	Sound.	1,341
81	1 inch square.....	0.992	0.055	1,365	Sound.	1,386
82	Rough bars.					
83	$1\frac{1}{2}$ inches diameter..	1.114	0.050	1,355	Sound.	1,392
84	$1\frac{1}{2}$ inches diameter..	1.113	0.055	1,440	Sound.	1,480
85	$1\frac{1}{2}$ inches diameter..	1.117	0.050	1,320	Sound.	1,316

Test bars furnished by E. E. Brown & Co., Philadelphia, Pa. Tested by W. C. Cutler, at the works of Riehlé Bros. Testing Machine Company, Philadelphia, Pa., June 29, 1894.

The fracture of all the bars is of a very pronounced crystalline white appearance.

Table VIII.—Summary of the Strongest Tests.

No. of bar.	Diameter of bars, Inches.	Transverse strength, per square inch.	Tensile strength, per square inch.	Specialties of mixtures.
12	Rough.	*37,110		Gun metal.
21	1.132	3,686		Gun metal.
	1.118	30,661		Chill roll.
25	1.124	8,044		Chill roll.
36	1.174	2,819		Car wheel.
33	Rough.	25,782		Car wheel.
45	1.072			Heavy machinery
48	1.135	2,791		Heavy machinery
49	1.007	25,799		Heavy machinery
57	1.166	2,115		Light machinery.
58	1.141	20,655		Light machinery.
68	1.118	1,813		Stove plate.
69	1.127	12,582		Stove plate.
81	1.113	1,480		Sash weight.
82	1.117	7,044		Sash weight.

* This tensile test is No. 1 of R. A. Robertson's report.

Review of Tests.

Having completed the records of tests, it is now in order to learn what they

Weak Irons.

Average of $\frac{1}{4}$ -inch square bars. Pounds.	Average of $1\frac{1}{2}$ -inch round bars. Pounds.
454	Light machinery. 1,778
100	Stove plate..... 1,589
167	Sash weight..... 1,406

It cannot but be plain from the above averages that the $\frac{1}{4}$ -inch square bar is an erratic size which affords no fair knowledge whatever of the true relative differences in strength of cast iron. The $\frac{1}{4}$ -inch bars from gun metal and the $\frac{1}{2}$ -inch bars from heavy machinery practically show each to be of the same strength, where the $1\frac{1}{2}$ -inch round bars indicate what we would naturally expect, namely, that the gun metal is materially stronger than the heavy machinery iron, the breaking load of the first being, per square inch, 3377 pounds, whereas the best we have of the latter is 2574 pounds. Then, again, the $\frac{1}{4}$ -inch bars would indicate that the heavy machinery iron was very much stronger than the roll irons, the breaking strength of heavy machinery being indicated as 395 pounds, while the chill roll bars show only 265 pounds. The $1\frac{1}{2}$ -inch round bars record the chill roll iron to be the stronger, as shown by its breaking load of 3002 pounds, as compared with 2574 pounds for heavy machinery. The strength of the $\frac{1}{4}$ -inch bars for light machinery, 454 pounds, indicates such iron to be stronger than gun metal, chill roll, car wheel or heavy machinery iron, while the $1\frac{1}{2}$ -inch round bars show the light machinery to be but 1778 pounds, as compared with 3377 pounds for gun metal, 3002 pounds for chill roll, 2687 pounds for car wheel and 2574 pounds for heavy machinery. The $\frac{1}{2}$ -inch bars show a breaking load of 160 pounds for stove plate and 167 pounds for sash weight or "white iron," indicating that the latter is the stronger iron, while our $1\frac{1}{2}$ -inch round bars show a strength of 1589 pounds for stove plate and only 1406 pounds for sash weight iron, thus thoroughly demonstrating that 1-inch area bars will fairly record the true relative degrees of strength of cast iron, whereas the $\frac{1}{4}$ -inch square bar gives us absolutely no knowledge or indication of any difference in strength between one mixture and another, or any irons used in the different specialties of iron founding. A fact that further demonstrates the impracticability of using $\frac{1}{4}$ -inch square test bars is that the tensile strength of Table VIII records a uniformity in degrees of strength closely corresponding with the transverse load of 1-inch area bars.

Some advocates of the $\frac{1}{4}$ inch square bar tell us to multiply the breaking load of such sized bars by eight in order to record the strength of cast iron per square inch. The data presented in this paper should surely prove the impracticability of such a practice. The test bars taken for the exhibition of relative data and obtaining averages of $\frac{1}{4}$ -inch square vs. $1\frac{1}{2}$ -inch round bars, in the rough and turned, are such as can be classed as of all sound fractures.

Round vs. Square 1-Inch Area Test Bars.

The next size and form of a bar we come to is that of the 1 inch square. In comparing the fracture of the square with those of the round bars I think all present will agree with the writer in as-

serting that the grain of the former will average denser and that the corners of all square bars, excepting those of "white iron" fracture, show the bars to be much denser at the corners than on the flat surface section of the bars, thereby causing more internal strains in a square bar and making it weaker than a round bar. This point the records of these tests fully prove, showing that the round bars record a greater strength than square bars of like area, proving that the writer is correct in advocating the round bar as most favorable for obtaining a relative knowledge of the physical qualities of cast iron. I do not wish to be understood as saying we should adopt the method which will show the greatest strength in the bar, but rather the one best to insure knowledge of the natural relative qualities of cast iron. To clearly illustrate the superiority of the round over the square bar we present the following comparison of averages in strength obtained per square inch by the sound round and square rough bars:

Table X.—Summary of Best Strength Averages. Round vs. Square Test Bars.

	Average of.	Pounds.
Gun metal.....	1 $\frac{1}{8}$ -in. round bars.....	3,086
Gun metal.....	1-in. square bars.....	3,344
Chill roll.....	1 $\frac{1}{8}$ -in. round bars.....	2,597
Chill roll.....	1-in. square bars.....	2,232
Car wheel.....	1 $\frac{1}{8}$ -in. round bars.....	2,553
Car wheel.....	1-in. square bars.....	2,350
Heavy machinery.....	1 $\frac{1}{8}$ -in. round bars.....	2,768
Heavy machinery.....	1-in. square bars.....	2,504
Light machinery.....	1 $\frac{1}{8}$ -in. round bars.....	1,931
Light machinery.....	1-in. square bars.....	1,705
Stove plate.....	1 $\frac{1}{8}$ -in. round bars.....	1,798
Stove plate.....	1-in. square bars.....	1,763
Sash weight.....	1 $\frac{1}{8}$ -in. round bars.....	1,406
Sash weight.....	1-in. square bars.....	1,362

The above figures present facts which should greatly aid to settle all disputes as to the value of the round over the square bar for recording the natural strength of cast iron.

Turned Test Bars.

The main object in testing cast iron for relative comparison should be to attain as nearly as practicable knowledge of the natural strength of an iron. The turned or planed bars best give us this information, next to which can be said to come the round rough bars. Only in two instances do we find the turned or planed bars giving greater strength than the rough bars. These are seen at tests Nos. 25 and 36; the former test shows a difference of 229 pounds compared with No. 33, while the latter shows only 64 pounds compared with test No. 22. The conclusion from this is that as far as a shop test is concerned the rough round bar can well answer all practical purposes, and for many outside purposes it is well to have a test of both the rough and turned bars. The system which the writer advocates for casting test bars permits of obtaining rough and turned test bars, cast at the same moment and of the same ladle, better than any plan of which he is informed. The tests further show us that it is only in the strong irons that the strength of turned and rough bars can closely approximate. In the soft or weak grades of iron the difference is much more pronounced. Causes for this are very apparent when we consider the more radical differences which exist between the exterior and interior of test bars due to the "chill" which walls of the mold can give to the surface of a test bar, as contrasted with a soft or weak center of the core in a test bar. This causes the former to be more largely composed of combined carbon and the latter of graphitic carbon than we find existing in hard or strong grades of cast iron.

Computation of Strength per Square Inch.

The main aim of the writer in this work is to assist in inaugurating some system whereby the founder, blast furnace man or any one can make fair comparisons of the natural relative qualities of cast iron. Whatever system is advanced for such testing I claim that none should be recognized as worthy of any consideration that requires us to take into account more than $\frac{1}{4}$ inch from the size of a test bar pattern to draw deductions for figures in strength per square inch. It matters not what size of a bar we take, be it $\frac{1}{2}$ inch, $1\frac{1}{8}$ inches, 2 inches or 4 inches square or round, the moment we attempt to figure down or up to ascribe a metal's strength per square inch or the more we divert from the exact size of the bar actually tested the more we will err in drawing correct relative deduction as to different grades of cast iron. The two columns of deductions relating to the strength per square inch with $\frac{1}{4}$ -inch square bars shown in this paper will illustrate the errors such bars lead to. I cannot believe such a practice, even with bars of $1\frac{1}{8}$ square inches area, being carried up to 2 or 4 inches, would prove much better to compute it up or down to strength per square inch without leading us to error in drawing conclusions as to relative values of cast iron. I would say such computations, in order to obtain a relative knowledge of cast iron, must be confined to the use of one size of bar and its computation should only be permitted in taking into account any variation which may exist due to irregular work in the molding and casting of that one sized bar. And in testing bars this effect from irregularity in molding, which can cause a variation in the size of test bars, should be taken note of in compiling any records of strength filed for reference or comparison. Note should be taken of the least variations which might exist in the size of a test bar, as a few thousandths part of an inch in the diameter of a bar is multiplied about three times in its circumference. A little variation in the size of a test bar will make a bar stronger or weaker according as its diameter is decreased or increased from the size of the pattern from which the test bars are molded. In compiling this paper it will be observed that the writer has thought it correct to recognize this factor, and hence the adoption of the column, "Strength per square inch," seen with most of the tables given here-with.

While the above comments are intended to be applied in figuring "strength per square inch" to any or all sizes of bars, the writer's study and experience would indicate that the $1\frac{1}{8}$ -inch round bar, which he advocates as the best form and size for obtaining a knowledge of the relative qualities of cast iron, has many points to recommend its general adoption over any other size which might be advanced. The records of this paper, I think, fully sustain the practicability of using a $1\frac{1}{8}$ -inch round bar for testing all grades of cast iron. And I would here say that the bar that cannot achieve such a result is of no value at all, for one reason, if no other. It is not practical to define where one size of a bar might leave off and another begin in giving us a knowledge of the natural relative qualities of cast iron.

We now urgently need the adoption of some one system whereby the founder can detect any variation in the natural physical qualities of his mixtures and

whereby the blast furnace men if called upon can inform a customer of the natural strength, deflection, chill and contraction, as well as chemical analysis of an iron, one to be a check to the other. This knowledge obtained, it is then left for the founder to judge what effect the sand, the rammer, the swab, the chill, or the form and thickness of a casting can have in perverting an iron from its natural state. He then can act accordingly in making his mixtures to best attain the end desired. When this day comes founders will find that chemical and physical tests mean a more favorable balance at the end of the year and a much greater uniformity in daily results from a mixture than is generally attained at the present day.

Shop System.

BY H. M. NORRIS.

It is true beyond a shadow of argument that every shop, no matter how small, will produce better work, a greater amount of work, and will yield a larger yearly income to its owners if conducted upon a systematic basis than if run in the old slipshod way of our forefathers.

No one system is adapted to the requirements of every establishment, but it is possible for a system to be so elastic as to meet the needs of all those manufacturing a similar line of work.

The system hereinafter described seems to possess many advantages, and has proved of so much value to the shop in which it is used that a short description would seem in order.

The superintendent, mechanical engineer, or man in charge of the mechanical branches of an engineering firm, first makes a rough sketch of a machine which he thinks will meet the requirements of a customer. The sketch is handed to the chief draftsman with whatever explanation is necessary. The chief draftsman looks up the subject, improves the design as he thinks best, and passes it on to a designing draftsman with any additional data and information he may have gathered. The problem, mayhap, is a difficult one, and in it the draftsman sees an opportunity of distinguishing himself. He is a high price man, a man possessed of no little mechanical ability, and one who has served his time as a machinist, has acquired some little knowledge of pattern making and foundry work, and, in short, knows a thing or two.

After thrashing the subject out until he formulates his ideas as to the best method of procedure, he selects the smallest standard size sheet that will hold three views of the machine drawn to one-quarter, one-half or full size scale, and then begins the general drawing, the small sheets being chosen because they are more convenient to draw upon, blue print from and handle in the shop, and the scales given the easiest to work with. The first view is so placed upon the sheet that the other two views may be readily projected from it without occupying the space set aside for the title in the lower right hand corner. At intervals as the drawing progressed the chief draftsman views the work and renders what aid he can in the way of criticism and advice, but under no circumstance does he order a change of design for the mere sake of displaying his authority, as is sometimes done.

So soon as the assembled drawing is completed to a point where the main lines of the design are clearly repre-

sented, the chief engineer and master mechanic, or shop foreman, are invited to inspect the work. Together with the chief draftsman and draftsman, they follow carefully the several points of construction and make whatever changes seem advantageous to its improvement. After this the drawing is finished up and all finished parts dimensioned. At this stage of the operation the machine may appear so much like a winner that it would seem advisable to build it in several sizes—say in six. By referring to the drawing book, the draftsman finds that the last family, or particular class of machines, were denoted by the letter D; so he calls this new line E. To distinguish the several sizes from each other, they are called 1, 2, 3, 4, 5 and 6 in regular order from the smallest to the largest. Then each casting and forging used on each of the six machines is also marked 1, 2, 3, &c., and these numbers suffixed to the letter denoting the family; the number standing for the size of the machine being affixed. So far as it does not make additional work, the pattern numbers of the same, but different size pieces, are the same throughout all sizes of machines—i. e., all the columns, beds, or main standards, will be marked 1, all the heads for the respective sizes marked 2, cones 3, &c. Hence by four symbols—a machine rarely being built in more than 9 sizes or containing more than 99 castings—the genealogy of a pattern may be read at once by merely glancing at the pattern marks. If marked 3E2 it says, "I am the head of the third largest machine in the E family." If the machine upon which the draftsman is at work is to be the second largest size of that family, then upon each pattern in the drawing he writes P2E1, P2E2, P2E3, &c., and upon the forgings F2E1, F2E2, &c.

one-half, one-quarter or one-eighth sheets ruled, respectively, to $26 \times 19\frac{1}{2}$ inches, $19\frac{1}{2} \times 13$ inches and $13 \times 9\frac{1}{2}$

S. M. S.—Bessemer or soft mild steel for shafts, pins, thrust washers, &c.
C. M. S.—Crucible or open hearth

1G	Section A of specifications.	Appleton Mfg. Com- pany, Phil- adelphia, Pa.	Pattern and core box mark.	Styles.				Drawing number and size of sheet.	Number pieces in pat- tern.	Number pieces in core box.	Number pieces in core box.	Weight of casting.	Remarks.
				1.	2.	3.	4.						
Machine.													
Bench.													
Head.....	1G1		1	1									
Pulley.....	1G2		1	1									
Spool.....	1G3		?	2									
Oil cap.....	1G4		2	2									
Inside flange.....	1G8		2	2									
Outside flange.....	1G10		2	1									
Plain.													
column.													
Plain column.	2G31		1	1									
Plate.....	2G33		1	1									
Water pot.....	3G37		1	1									
Water pot holder.....	2G34		1	1									
Countershaft column.	2G32		1	1									
Plate.....	2G33		1	1									
Water pot.....	3G37		1	1									
Water pot holder.....	2G34		1	1									
Driving pulley.....	2G35		1	1									
Tight pulley.....	2G36		1	1									
Loose pulley.....	?		1	1									
Countershaft collar.....	2G38		1	1									
Box.....	2G39		2	2									
Box holder.....	2G40		2	2									
Dust cap.....	2G41		2	2									
Shifter rod collar.....	3G46		1	1									
Shifter stand.....	2G42		1	1									
Shifter handle.....	2G43		1	1									
Shifter lever.....	2G44		1	1									
Shifter fork.....	2G45		2	2									

Fig. 3.

inches, which are convenient sizes to cut from rolls 42 inches in width. Under each piece shown in the detail drawings is written its name, pattern or forging number, number of pieces

steel for arbors, stiff shafts, soft spin-dles, &c.

C. R. S.—Cold rolled steel for shafts and rods not requiring finish.

C. R. I.—Cold rolled iron for shafts not requiring finish.

W. I.—Wrought iron for bolts, tie rods, screws, nuts, washers, &c.

P. Bz.—Phosphor bronze for bearings, boxes, &c.

Bz.—Bronze.

B.—Brass.

M. I.—Malleable iron.

C. I.—Cast iron.

F. G.—Fiber-graphite.

Bbt.—Babbitt.

When all drawings are finished they are given to the examiner, who first checks up the general drawing and then uses it as a standard to check up the details. When the whole set is corrected the examiner inserts his initials in the allotted space in the title and passes the drawing on to a tracer. The tracer uses shade lines on all tracings, making them of sufficient breadth to insure good blue printing. For dimensioning and lettering a Chinese writing stick is used and the letters and figures made round and vertical. All center lines are drawn in solid red, dimension lines in solid blue, and the lines used for projecting parts to a convenient place for dimensioning in dotted blue. After all the tracings are finished they are given to the comparer, whose duty it is to compare them with the drawings to see that the drawings have been correctly followed. When all necessary corrections have been made the tracings are sent to the blue printer, who makes two copies of each—one to go into the vault as a safeguard against loss by fire and the other to be mounted and held in readiness for the shop when wanted. The full and half size blue prints are mounted upon boards by means of a starch paste, and the one-quarter and one-eighth sizes upon sheet iron with white shellac.

TIME 2E	
GENERAL DRAWING	
SCALE 3"=12"	MAY 25th 1894.
DEL. N.E.S.	EX. C.A.P.
TRD. T.A.S.	COM. J. H.
APPLETON MFG. CO.	
PHILADELPHIA, PA. 3843½	

Fig. 1.

After the drawing is entirely finished the title is filled in, as shown in Fig. 1, and is always made the uniform size of $3\frac{1}{2} \times 2\frac{1}{2}$ inches. The whole number in the corner denotes the number of the drawing and the fraction the size of sheet, the use of which will soon be seen. The spaces marked Ex., TRD. and COM. are reserved for the initials of the examiner, tracer and comparer and are filled in at the end of each operation. While the designing draftsman goes on with other work that is assigned to him, several cheaper men are set to work upon the detail drawings, the designing draftsman being held responsible for their correctness. These drawings are usually made on section ruled paper.

Since three views of a machine of any size occupy considerable space the general drawings are usually made upon full sized sheets ruled to $39\frac{1}{2} \times 26\frac{1}{2}$ inches and the details upon

wanted and kind of material, arranged as shown in Fig. 2.

COLUMN HANGER

I-C.I. 3A45.

Fig. 2.

Each draftsman is supplied with a list of standard screws and nuts, taper pins, reamers, washers, keys—the Woodruff key being preferred—handles, wrenches, T-slots, ball bolts, nuts and washers and symbols of metals and for what used, the last sheet reading as follows:

T. S.—Tool steel for cutters, spindles, fine hardened points, &c.

S. S.—Stubbs steel for all small parts required to be extra good.

S. C.—Steel casting for parts requiring greater strength than cast iron.

PATTERN SHOP ORDER

APPLETON MFG. CO.

Philadelphia, Pa., May 25, 1894

Please make the following patterns for

2 K

All patterns for 24"
Loos Grinder.

Tom Jones
Draughtsman.

Draughtsman.

G. H. Follows.
Chief Peasantman

Chief Draughtsman.

Fig. 4.

ment," &c., and each printed upon different colored paper.

When the foreman of the erecting shop receives orders to go ahead with the new work, he sends to the drawing room for the necessary blue prints and assigns the work. If, as in this case, the work is new, it is given to the most trustworthy men, so that the time spent upon it will be correctly charged on the time cards, shown in Figs. 5 and 6. These cards are afterward enveloped until such a time as piece work prices can be determined upon for each operation, and the prices registered in the piece work book, after which the workmen go to the piece work clerk and receive a stated price for each job, apprentice boys being allowed 25 per cent. more time in which to do the work than the men. To describe the system in all its details would monopolize far too much space; the smattering here given, however, will convey some

Meanwhile the specification sheets are made out from the original drawings, as shown in Fig. 3. This particular list applies to the smallest size of a G grinder and comprises a complete catalogue of all castings with their pattern and core box mark, number of each required of any style for one machine, drawing number and size of sheet, number of pieces in pattern and core box, number of core boxes and average weight of each casting. By this method orders are simplified to merely stating the number of machines wanted of a certain family, size, style, and how mounted. Thus an order reading 25 style 2 1G countershaft column means 25 saw gummers of the smallest size of the G family, mounted upon a countershaft column.

After the tracings return from the blue printer they are assigned to two drawers, marked 2E, the upper of which holds all full size sheets, and the lower partitioned off for one-half, one-quarter and one-eighth size sheets, each set of drawings having a pair of drawers. If some 2E machines are to be built at once, the draftsman fills out a blank, as shown in Fig. 4, which is then countersigned by the chief draftsman and sent to the pattern shop. Orders for other departments are filled out in a similar manner, but upon blanks headed "Foundry," "Blacksmith Shop," "Cutting Off Depart-

Fig. 6.

Lot No. 49 Shop Mark 246 Date 6/8 1894
 No. of Pieces 7 Price 3.75 Total Time 11 1/4 Hrs.
 Name of Piece Cone Pulley
 Operation Turning & Polishing
 Workman Geo. Greelead No. 420
 Foreman's Remarks O.K.

Please do the following work on conditions printed on back. Charge time
 correctly and return this slip to your Foreman as soon as work is completed.

TIME CARD.
 (Please keep it clean.)

APPLETON MFG. CO.,
 Philadelphia, Pa.

Fig. 5.

idea of its main frame work and general workings. More is not necessary.

The present depressed condition of the cold rolled steel business has led to a meeting of the manufacturers of this product, which was held in New York on October 24. It is understood that only seven of the 12 cold rolled steel concerns of the United States were present, and that no attempt was made to form a trust, the object of the conference being to discuss some means of obtaining a uniform price for their products. It was given out that the meeting disbanded without accomplishing anything that will help prices at present.

New cement works of great dimensions are being established at Phillipsburg, N. J. A company has been formed, with \$300,000 capital, to operate them when completed.

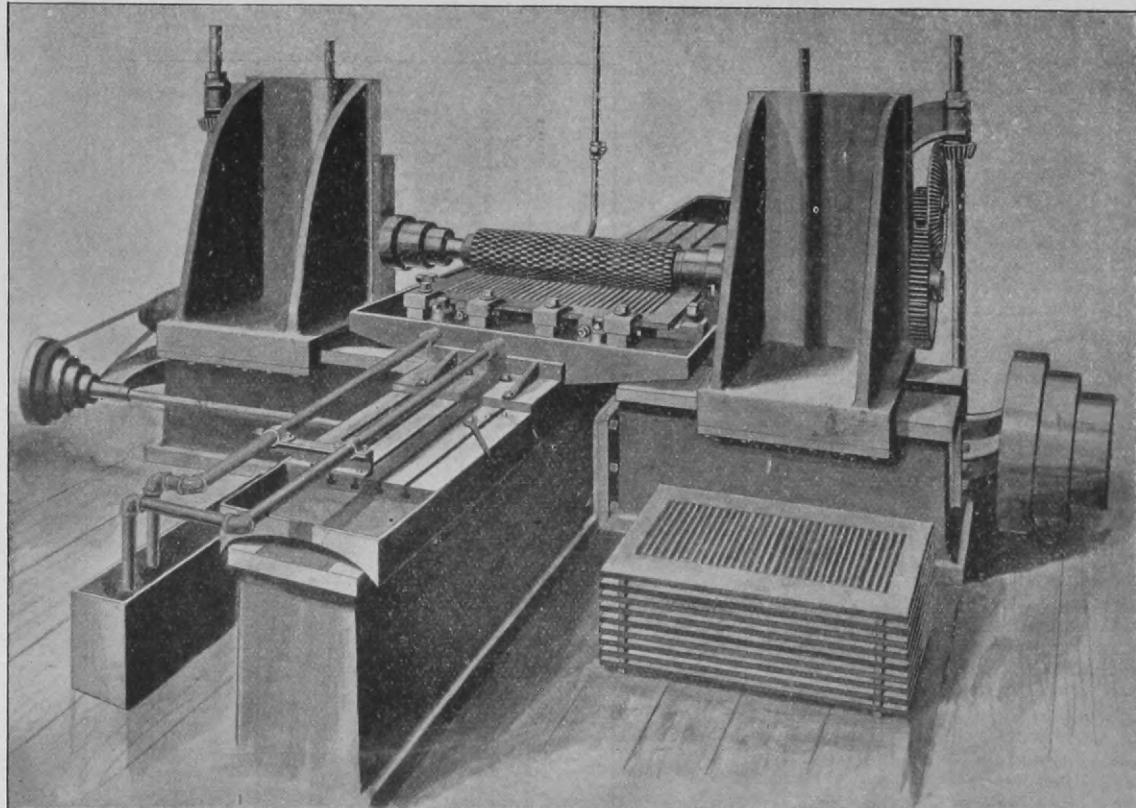
A Lesson in Milling.

An achievement in the line of surface milling which so far surpasses anything in the ordinary as to make it of special interest, is at present in progress at the works of the Pratt & Whitney Company, Hartford, Conn., and which is illustrated herewith from a photograph taken of the machine in operation. The work consists in the corrugation of metal plates by milling, using gang mills and finishing a plate at one cut. These plates are of steel $\frac{1}{4}$ inch thick, 24 inches wide and 40 inches long. The corrugations are formed of arcs of circles of $\frac{3}{16}$ inch radius and cover a surface 20 inches wide by 33 inches long and are milled to a depth of $\frac{5}{32}$ inch, requiring as will be seen a gang of mills 33 inches in length to do the work.

block or eight mills are cutting at one time. The plates are milled at the rate of about one an hour, including changing, and the mills, being kept well lubricated, run from six to seven days without grinding.

The machine in which these mills are operated and shown in the illustration is built by the Pratt & Whitney Company and known as No. 7 double head power miller, and is probably the only machine built in this country capable of doing this work. It was designed and built to meet the requirements of work of this kind. It is built with either single or double head and provisions made for driving both heads together or separately as is necessary. The table is driven by a large and extra long worm gearing with rack on under side. This worm is in halves and is adjusted for taking up wear in threads. It has

The Garrett Rod Mill.—A letter to the *Bulletin* of the American Iron and Steel Association, from William Garrett of Joliet, Ill., gives the following information concerning the work of the rod mill of which Mr. Garrett is the inventor: The largest single turn (10 to 11 hours) on a Garrett rod mill is 390,640 pounds, or 174 gross tons. The largest double turn (22 hours) on a Garrett rod mill is 742,000 pounds, or 331 gross tons. The largest week (11 single turns) on a Garrett rod mill is 1640 gross tons. The largest month on a Garrett rod mill is 6340 gross tons. There are four Garrett mills in this country which have each produced over 6000 gross tons of rods in a month, and honors are divided among them. Some have the largest turn on No. 5 rods; others the largest turn on No. 4. The largest single turn referred to above was made when rolling



A LESSON IN MILLING.

Spencer Kellogg of Buffalo, N. Y., for whom this work is being done, uses in the manufacture of a certain product about 1000 of these plates, and so great has been the need of them that it has been necessary to work 24 hours per day, using double sets of mills to avoid the loss of time consumed in grinding.

The manner of making these mills will be of interest. One set is made up of 30 separate pieces 8 inches in diameter, $1\frac{1}{2}$ inches wide and 4 inch bore, the faces of each being ground so that the joint will show as little as possible on the milled surface. In the other set there are four mills only, or four blocks. Two of the blocks contain nine each of the corrugations, one eight and one seven, making the same number as the former set and being the same dimensions otherwise. They are interlocked, forming in effect a solid mill 38 inches in length, 8 inches diameter, and leaving a surface absolutely smooth. The cutting edge of each row of teeth in the blocks is set far enough back of the teeth in the preceding one so that only one

ball bearing collars on both ends for taking the thrust.

The spindle is of steel with tool steel thrust collars hardened and ground. The front bearings are 11 inches long and $5\frac{1}{2}$ inches in diameter. The greatest distance between the centers is 54 inches; least distance 14 inches. The greatest height of the center of the spindle above the table is 25 inches; least height 4 inches. The table is $20\frac{1}{2}$ inches wide and the length is the limit of its travel. The speeds are so arranged as to take cutters from $4\frac{1}{2}$ to 18 inches in diameter.

The present work, while not showing the result in cubic inches of stock removed per minute, as in milling side rods and like work, is probably the severest test the machine has been put to, owing to the great length between centers and amount of surface involved. The milled surface is of uniform smoothness and is entirely free from any evidence of chatter, which might be expected in a gang of mills of this length.

No. 4 rods. Over 156 gross tons of No. 5 rods have been rolled on a single turn. There are 18 Garrett rod mills in this country capable of producing from 65,000 to 70,000 tons of wire rods in a year.

A useful pamphlet recently published by the Interstate Commerce Commission on trade organizations, contains a list of the national, State and local commercial organizations in the United States, together with a large amount of information connected with each association, corrected up to September 1. This list is to be issued in a revised edition from time to time. The present publication shows that there were, on September 1, 31 national, 14 State and 2021 local commercial organizations in the United States, every State and Territory being represented in the list. New York State heads the list with 2 State and 221 local organizations, of which New York City claims 58 local, beside being the headquarters of five national organizations.

Rolling Wire Rods Directly From Small Ingots.

In the issue of *The Iron Age* of July 12, 1894, we published a report, made

withheld. *Stahl und Eisen* now prints details of the plant, which is that of the Haspe Eisen und Stahl Works, the design being that of W. Haenel. It is in line with the idea held by some

largely of the relative cost and waste of handling steel in the pit and of blooming. American practice would probably incline toward fast work by handling large ingots by preference. Still,

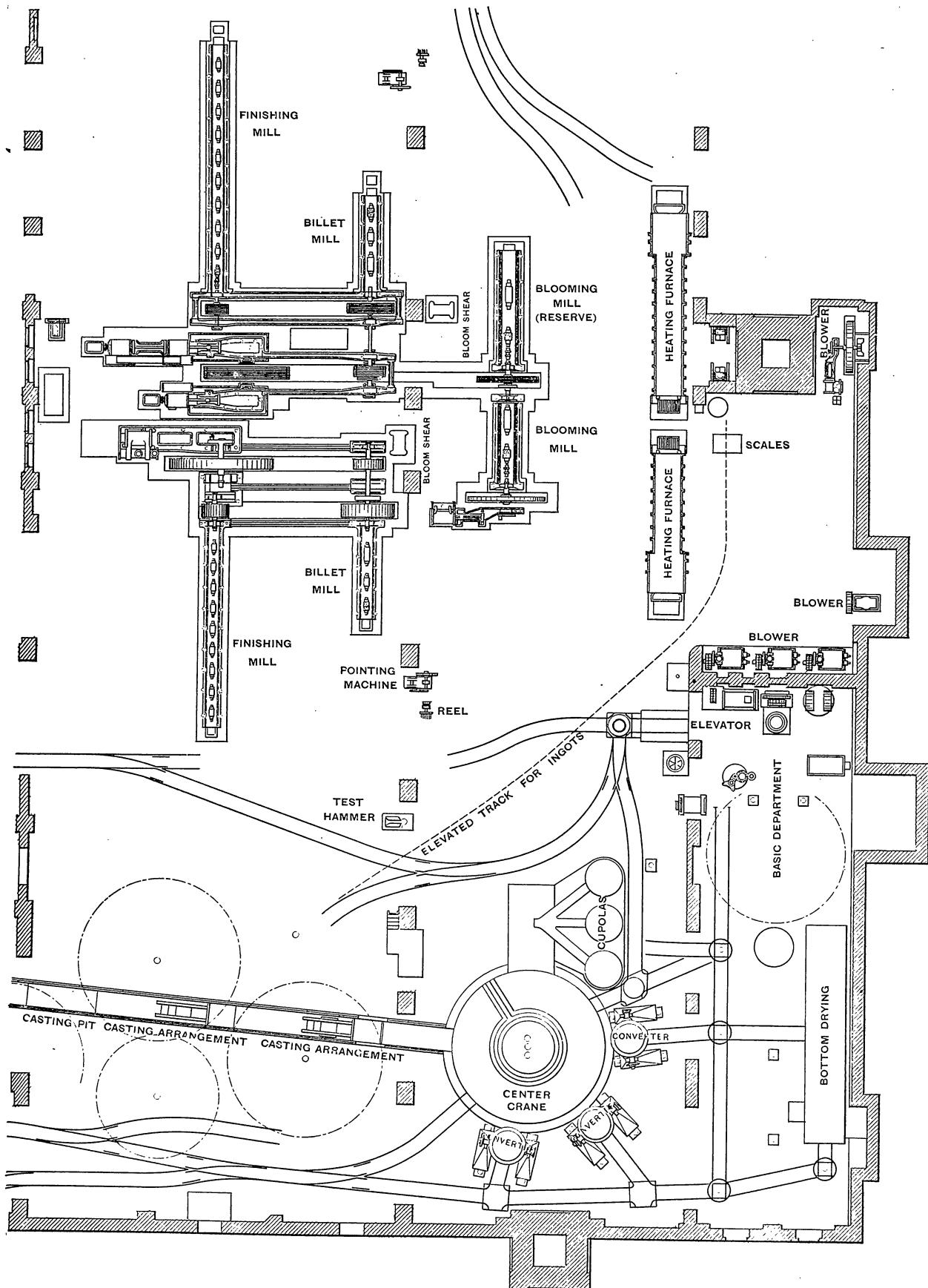


Fig. 1.—Plan of the Haspe Basic Steel Works and Wire Rod Mill.

by a Belgian engineer, M. Roze, on a mill in use in Germany for rolling wire rods direct from small ingots. The name of the establishment was then

rolling mill men that quite an unnecessary amount of work is being put into wire rods by starting from large ingots. Of course it is a question

the German plant possesses a good deal of interest.

The basic steel plant, the general arrangement of which is shown in Fig. 1,

has three 5-ton vessels and three melting cupolas. The department for preparing the basic materials adjoins it.

It contains a furnace for calcining dolomite, a chili mill and a Belgian mill, a mixer, hydraulic brick press and a bottom drying oven, the whole served by a hydraulic crane. The casting ladle is handled by means of a steam casting car, which is moved along above the casting pit. This casting pit, which is very long, is served by four differential casting cranes and two auxiliary cranes. It has room for three special casting apparatus and two ordinary groups of ingots. The casting apparatus provides for taking care of the entire charge of one 5-ton converter by one group of ingots. For this purpose 40 ingots of 120 kg. (264 pounds), or 48 ingots of 100 kg. (220 pounds), or 60 ingots of 80 kg. (176 pounds) are cast at the same time, bottom casting being used. The ingots are cast in groups of four or six, the

In casting small ingots and light sheet slabs the average capacity of the works is 29 charges of 4.7 tons each in a 12-hour shift.

The double mill, which is located close to the steel plant, Fig. 1, is served by two heating furnaces, whose waste heat is utilized by boilers placed above them. The ingots are carried over to them by means of an elevated track, and after going over the scales the ingots are charged into the furnace by means of a hydraulic apparatus. The rod train itself consists of a 15.75-inch blooming mill, driven direct by an engine making 80 revolutions per minute. Another set of blooming rolls in line with it is driven by rope transmission and serves only as a reserve. The rod mill proper has the usual arrangement and has no features of special interest. A shears is provided for shearing the blooms from each of the two blooming trains. On these trains, the rolls of which are made of forged steel, ingots

the Brooklyn Steel Works. They were inclined at an angle of 40° on the service 6-pounder mount, for the inclined fire, and were attacked by a Hotchkiss 1-pounder. The first shot directed against the Midvale steel $\frac{1}{2}$ -inch plate, inclined 40° , was given a velocity of 1480 feet per second, and by its impact developed a through crack. The second shot, with a velocity of 1600 feet, made a gouge in the plate, but failed either to perforate or crack. In the third round the shell, with a striking velocity of 1750 feet, smashed out a piece of the plate and developed three cracks—one through. The plate was placed normal to the line of fire in the fourth round, but with a velocity of 932 feet the shell failed to do any damage. The $\frac{1}{2}$ -inch Midvale plate was perforated by a bullet from a service rifle at a distance of 150 yards. Before this plate was treated the rifle bullet failed to penetrate at 100 yards. The Brooklyn steel plate made such a poor showing in the first round that the normal shot was omitted. The shell in the first round, given a striking velocity of 1256 feet a second, broke out an irregular piece of the plate and cracked it through from impact to its top. The $\frac{1}{2}$ -inch Brooklyn chrome steel plate was cracked through in two places. With a service rifle the plate was perforated twice at 50 yards.

A New Gaseous Constituent of Our Atmosphere.

A communication made by Lord Rayleigh and Professor Ramsay was one of the events of the recent meeting of the British Association. In his determinations of densities of various gases Lord Rayleigh noticed that the nitrogen isolated from the air was denser by $\frac{1}{2}$ per cent. sometimes than the nitrogen liberated from chemical compounds. He attacked the problem systematically, together with Professor Ramsay, and they have now isolated a new gaseous constituent so inert that Mr. Shaw claimed it altogether for Section A, as it had no chemistry. The authors first applied Cavendish's method: A mixture of air and oxygen is submitted to electric sparks in the presence of alkali until no further contraction takes place and the oxygen then absorbed by pyrogallol. The second method answered better: The oxygen is absorbed, the nitrogen bound by magnesium, with which it forms a nitride, and the residual gas collected. The density rose from 14, nitrogen, gradually to 14.88, 16.1, and finally to 19.09. The spectrum resembles that of nitrogen, but certain lines, specially the characteristic blue nitrogen line, came out much more brilliant. Only 100 c. cm., about a sixth part of a pint, have been obtained as yet. This is owing to the extreme difficulty of isolation; the new compound may form 1 per cent. of the nitrogen of our atmosphere. It does not liquefy at atmospheric pressure, a circumstance which may account for the turbid character of some of Professor Dewar's liquids. The triumph of the discovery lies in the fact that there was no reaction to guide the investigators, no lucky chance element; it is simply the outcome of most exquisite exactness in determining physical constants. The authors declined to be drawn into any further statements; they had told all they knew. If the body be an element—the authors carefully guarded themselves against any such dictum—it would fit nicely into the tables of atomic weights, the Periodic

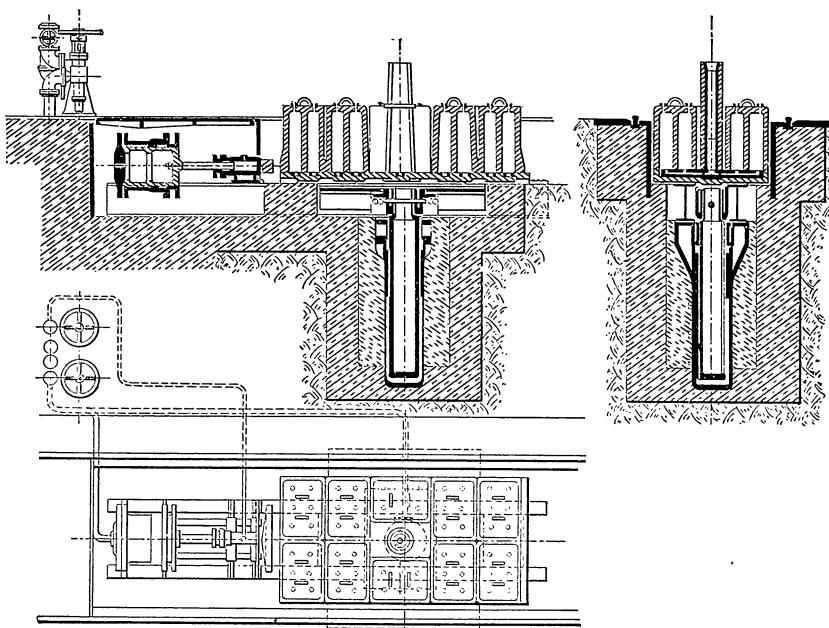


Fig. 2.—Haenel Arrangement for Casting and Handling Small Ingots.

molds being closed by a conical stopper, provided with an air hole. The facility with which the stopper can be taken out renders it an easy matter to strip the molds if one or the other ingot should happen to stick. The method of casting the small ingots in groups has proved very satisfactory. The ingots are smooth, have solid heads, and are well adapted to rolling small sizes. A simple apparatus has been introduced to facilitate the work in the casting pit and lower the cost of it. The accompanying engravings show the arrangement. Substantially, it consists in moving all the molds by means of a hydraulic cylinder at the time when the steel begins to set, thus shearing off the sprues. The apparatus dispenses with a crew of eight men who were formerly necessary to knock off ingots and at the same time makes it possible to produce larger quantities of small ingots and to increase the life of the molds. The latter is attributed to the rapid work and to the quick removal of the hot ingots. A lifting cylinder under the casting plate provides for elevating the group of ingots to the general level of the shop and makes the pit work a good deal easier.

of 150 mm. (5.91 inches) and 120 kg. (264 pounds) weight are rolled down to 48-mm. (1.89-inch) blooms in nine passes. When it is desired to roll rods weighing 50 to 55 kg. (110.24 to 121.26 pounds) the billet is cut into two pieces, one of which goes to the right hand and another to the left hand billet mill. When rods weighing from 33 to 38 kg. (72.76 to 83.78 pounds) are to be rolled, the bloom is cut into three pieces, of which alternate two go to the right and one to the left. Finally, when it is desired to roll 25 to 28 kg. (55.12 to 61.74 pound) rods, the bloom is sheared into four pieces, two of which go to the right and two to the left.

The average capacity of this double mill, on 4.9-mm. (0.1929 inch) rods, is 56 tons per shift of 12 hours, while with larger sizes it rises to 64 tons.

A recent press dispatch from Washington, D. C., reports that the Navy Department has received from Ensign Tisdale of the Indian Head proving grounds a report on the test of thin shield plates, $\frac{1}{4}$ inch and $\frac{1}{2}$ inch in thickness, of chrome steel, manufactured by the Midvale Steel Works and

Law of Newlands, Mendeleieff and Lothar Meyer. There is room enough in the eighth column between the atomic weights 19.06 fluorine (column

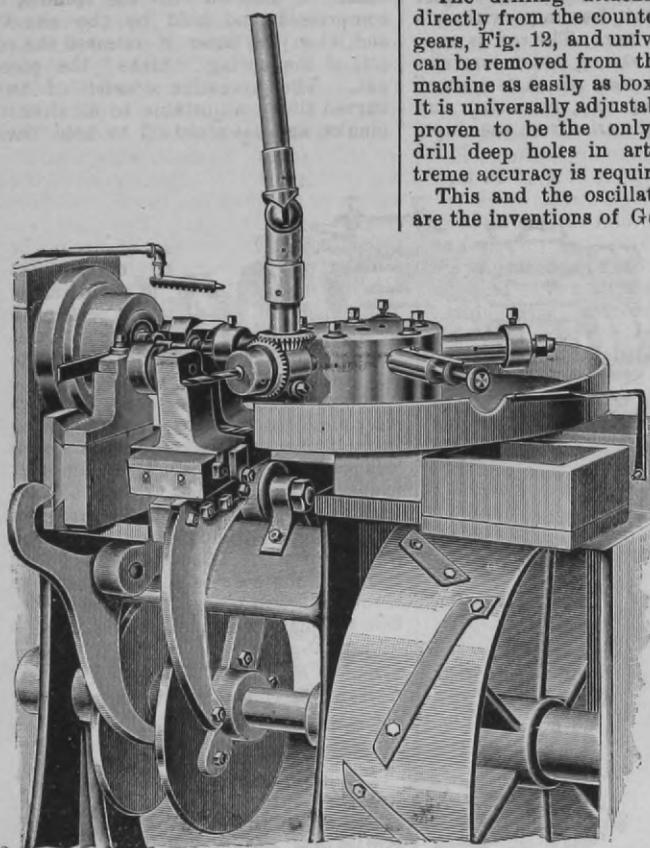


Fig. 11.—Universal Drilling Attachment on Turret.

vii) and sodium 23 (column i); the higher orders of this column comprise the iron, ruthenium and platinum groups. Most of the speakers, Sir Henry Roscoe, Professors Emerson, Reynolds, Roberts-Austen, and Gladstone, felt tempted to accommodate the stranger with a place in Mendeleieff's table.

In view of the unusual transfers of gold between March 1 and October 1 of this year, the Treasury Department has issued a statement showing the details of such shipments during that period. The statement shows that there was moved to New York from Washington, \$12,000,000; from Baltimore, \$4,500,000; from Philadelphia, \$3,600,000; from Boston, \$500,000; from Cincinnati, \$11,500,000; from Chicago, \$5,000,000; from St. Louis, \$3,500,000; from New Orleans, \$2,000,000; from San Francisco, \$7,500,000; from the Philadelphia Mint, \$69,960,000; from the Denver Mint, \$950,000; from the San Francisco Mint, \$7,500,000; from the Carson City Mint, \$2,000,000; from the Philadelphia Mint to Washington, \$3000; to Philadelphia, \$4,100,000; to Boston, \$5,900,000, and to Chicago \$500,000. From the San Francisco Mint to St. Louis, \$1,000,000; from the New Orleans Mint to New Orleans, \$1,100,000; from New York to Boston, \$250,000. A total of \$143,668,000, which cost \$91,624 in shipping rates. In addition there was shipped from banks to Treasury offices \$1,614,500, costing \$1856, a grand total of shipments of gold of \$147,307,500, and of charges \$93,480.

The Hartford Automatic Screw Machinery.—II.

The drilling attachment is driven directly from the countershaft by bevel gears, Fig. 12, and universal joints, and can be removed from the turret of the machine as easily as box or other tools. It is universally adjustable and has been proven to be the only tool that will drill deep holes in articles where extreme accuracy is required.

This and the oscillating attachment are the inventions of Geo. E. Witherell

requires a second series of operations upon the end opposite the one formed by the set of tools which make the cuts upon the piece before it is severed from the rod, and consists of an auxiliary spindle mounted parallel with and above the main spindle, driven from the latter by spur gearing, and a device for grasping the article when cut off, turning it end for end and inserting it in the upper spindle where it is finished by independent tools carried in the turret, above those making the first operation.

A cam on the cam shaft operates a lever whose outer end is attached to a lazy tongs placed vertically alongside the spindles. At the top these tongs work a cross head, to which a spirally grooved shaft is attached. This shaft works vertically through a sleeve provided with spring grips at its lower end. The sleeve is placed on the end

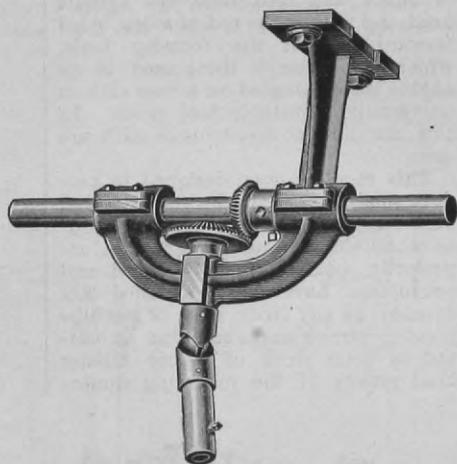


Fig. 12.—Driving Shaft Connection for Drilling Attachment.

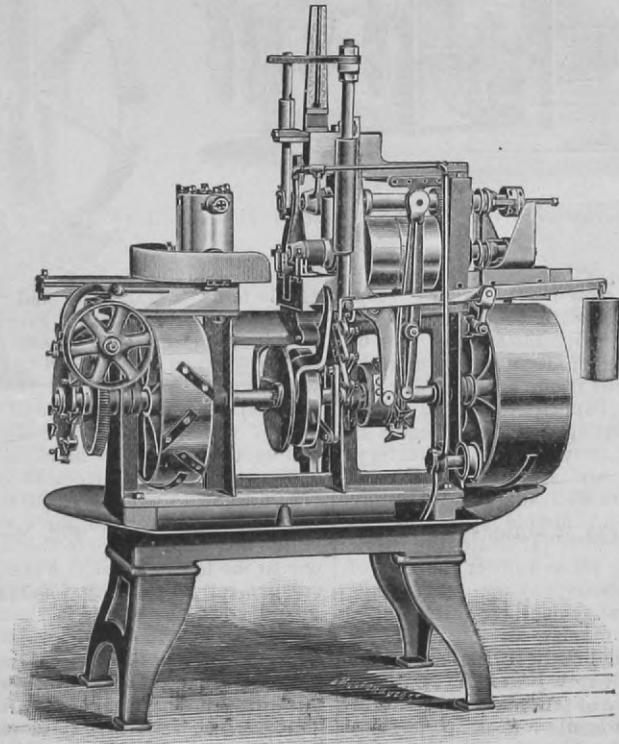


Fig. 13.—The Briggs Attachment.

THE HARTFORD AUTOMATIC SCREW MACHINERY.

superintendent of the Hartford Machine Screw Company.

The Briggs attachment, Fig. 13, is designed to produce a class of work which

of a slide that may be moved longitudinally by adjustable cams on the cam shaft. The spirally grooved spindle descends and the grips spring

over the work, which is then cut from the rod. Then the lazy tongs raise the work, which is turned, end for end, by the spiral shaft during its ascent. The sleeve slide then inserts the opposite end of the work in the upper chuck. After this the grip is raised out of the way.

The automatic watch screw machine, Fig. 14, is essentially the same as those previously described, except the turret, which has no reciprocating motion, but is mounted on a horizontal axis parallel with the main spindle, and through which slide in succession tool holding spindles, a construction which allows the turret to be rotated at a very high speed, insuring exceedingly quick changes from one operation to another.

The small automatic screw machine with reciprocating spindle head is constructed on an entirely different principle. While it has the same arrangement of chuck and feed tube, the spindle head, and with it the rod of stock, is fed forward against the forming tools, which are similar to those used in an engine lathe mounted on a cross slide in universally adjustable tool posts. In this machine no box tools or mills are used.

This machine was designed to produce small turned articles rapidly, and all the moving parts are made as light as consistent with proper strength, are perfectly balanced and a speed and production have been attained not equaled by any other form of machine making turned work, reaching an output in brass work of 20,000 fillister head screws of the following dimen-

ces to form a taper or other shape, the cutting edge always bears the same relation to the center of the stock without regard to the diameter, thus making it possible to produce the same taper, varying from the smallest to the largest size of stock within its range with one setting of the former. The rod is supported by a very strong and universally adjustable back rest, which is located over the turning tool, obviating any trouble that might arise from the chips,

same as heretofore described, but in place of the feed plunger it has an ejector rod, around which and inside of the chucking plunger is a long spiral spring which, when the screw or other blank is inserted into the spindle, is compressed and held by the chuck, and when the latter is released the recoil of the spring "kicks" the piece out. The magazine consists of two curved slides, adjustable to all sizes of blanks, and has a cut off to hold back

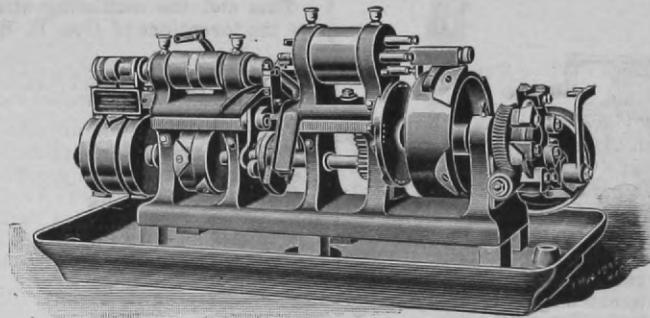


Fig. 14.—Automatic Watch Screw Machine.

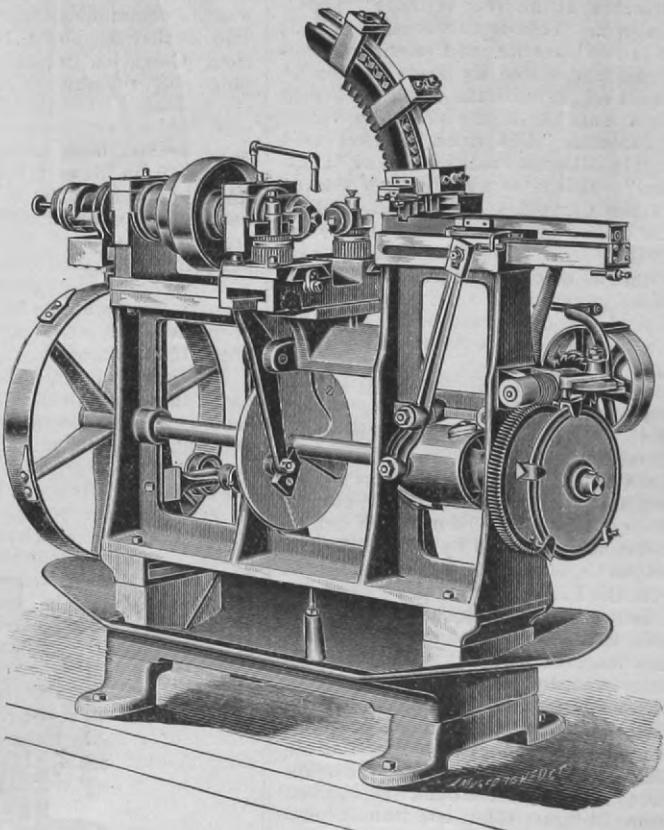


Fig. 16.—Automatic Shaving or Refinishing Machine.

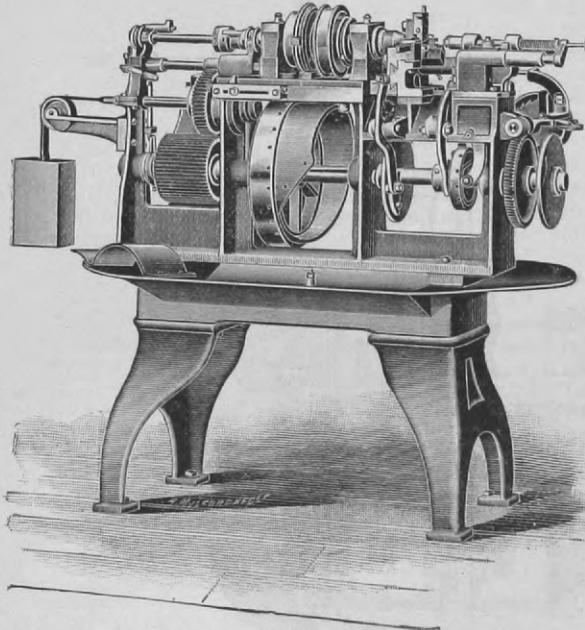


Fig. 15.—Automatic Forming Machine.

THE HARTFORD AUTOMATIC SCREW MACHINERY.

sions: Head $\frac{1}{8}$ inch in diameter, body $\frac{1}{8}$ inch and length $\frac{1}{4}$ inch in the usual working day of ten hours.

The automatic forming machine, Fig. 15, as the name implies, is adapted to the production of irregularly shaped work and is built in two styles, a plain machine for work that does not require threading and another with reversing motion for spindle and device for cutting threads. The forming tool is carried by an oscillating holder of novel construction, which secures the utmost rigidity, and the position and motion of the tool are such that, as it re-

ceases to form a taper or other shape, the cutting edge always bears the same relation to the center of the stock without regard to the diameter, thus making it possible to produce the same taper, varying from the smallest to the largest size of stock within its range with one setting of the former. The rod is supported by a very strong and universally adjustable back rest, which is located over the turning tool, obviating any trouble that might arise from the chips,

which readily fall away, always leaving the bearing clean. The solidity and adjustment of the several parts of this machine are such that it is capable of cutting from 1 to $2\frac{1}{2}$ inches per minute. An efficient automatic device stops the machine when the rod has been exhausted.

The automatic shaving or refinishing machine, Fig. 16, which was designed to finish the heads of screws, rolls, &c., is more properly semi-automatic, as the magazine has to be filled by hand; but one boy or girl can easily feed from 6 to 12. The chucking mechanism is the

all the articles except one, which at the proper time drops into the carrier, and by very simple and suitable levers and cams is pushed forward into the chuck jaws and there grasped. The circular shaping or finishing tools are carried on a very rigid cross slide—one at each end, the one on the front side being a roughing tool for removing the surplus stock, and that at the rear a finishing tool which on many kinds of work leaves a surface that needs no polishing. A stop motion, which operates at any point of the travel of the carrier, prevents the breaking of any part of the machine if the

screw in the chuck fails to be promptly ejected and also prevents imperfect work in case a bolt or other article should chance to have a large burr or other obstruction preventing its proper seating in the jaws.

[THE END.]

The Iron Ores of the Mediterranean Seaboard.—II.*

BY A. P. WILSON, ASSOC. M. INST. C. E.,
F G S.

Iron Ores of the Province of Almeria.

The province of Almeria is particularly rich in iron ores and contains nearly every variety—brown hematite carrying 48 per cent. of iron and 10 per cent. of water of hydration; rich manganeseiferous ore, containing 53 per cent. of metallic iron and 9 per cent. of metallic manganese, with only 3 per cent. of moisture, and magnetites carrying up to 64 per cent. of metallic iron.

Beginning at the eastern end of the province, the first mine of importance is that known as Herrerias-de-las-Cuevas, on the left bank of the river Almanzora, at the foot of the Sierra Almagrera. This deposit consists of beds of red hematite and manganeseiferous iron ore separated by layers of decomposed schists, and the whole is covered by a mass of what is locally called "limestone," but which is in reality a highly siliceous oxide of iron or "gossan." This mine was formerly worked by the Campaña de Aguilas, and in the course of their working below the level of the Almanzora, which flows within 50 m. of the workings, the river broke in and flooded the mine, the bottom of the open cast being 17 m. below the level of the river. After lying idle for some years a London firm took over the mine and built a masonry retaining wall 120 m. in length and 12 m. high, which has most successfully dammed back the river. As a result of this work, there is now available a large area of iron ore bearing ground, a large portion of which can be and is being worked by open cast. The ore as it is broken has to be hauled from the bottom of the open cast up inclined planes, of which there are two, both with double roads. The mines are connected with Palomares, the shipping port, by a narrow gauge railway 5 km. in length. Palomares is an open roadstead, and here, as at most iron ore shipping places on the south coast of Spain, the loading of the ships has to be done in the open roadstead by means of lighters, but less difficulty and delay are experienced on this account than might be expected.

The following may be taken as an average analysis of the general bulk of the dried ore from the Herrerias-de-las-Cuevas Mine:

	Per cent.
Moisture	3.23
Peroxide of iron	75.25 = 52.65 per cent. metallic iron.
Peroxide of manganese	13.44 = 8.50 per cent. metallic manganese.
Alumina	0.95
Lime	0.24
Magnesia	0.09
Silica	2.12
Sulphate of barium	2.72 = 0.373 sulphur.
Copper	0.007
Arsenic	Trace
Antimony	0.165
Lead	0.034

* Read at the Brussels meeting of the Iron and Steel Institute.

	Per cent.	Pesetas.
Phosphoric acid	0.018 = 0.008 per cent. phosphorus.	Per ton.
Cobalt	0.290	2.00
Soda	0.380	1.25
Combined water	4.200	1.00
		1.00
Total	99.854	5.75

The costs of working and putting the iron ore on board ship at Palomares may be estimated as follows:

	Per cent.	Pesetas.
Getting and piling the ore	2.25	Per ton.
Carriage to Palomares	1.00	1.00
Loading into steamers	1.00	1.00
Management and sundries	0.50	0.50
Royalty	1.00	1.00
		1.00
Total		5.75

Equal at current rate of exchange to about 3 shillings and 5 pence per ton.

The present output of this mine is about 5000 tons of ore per month, and the quantity is increasing. The ore is in good demand at works in England and Wales for the manufacture of spiegel iron and for the Bessemer process, and it commands a high price.

Sierra de Bédar.

In this district there are innumerable iron ore mines, some of which promise to develop into properties of the first magnitude. But few of the mines are being worked at present, owing to the want of communication with the coast. The locality is about 16 km. inland from Garrucha, which is the shipping port for the district. The ores are hematite, limonite, and magnetite, and their occurrence is practically the same as has been already described. The ore from some of the mines is very small, only from 10 to 15 per cent. being of a lumpy character; but there are properties which yield nothing but hard lumpy hematite of the first quality. All the producing properties at the present time are here being worked by open cast, and the annual output is about 150,000 tons.

The principal mines are Jupiter, Porfiado, and San Manuel. The ore, which occurs as brown hematite carrying 48 per cent. iron, and as soft purple hematite carrying over 60 per cent. iron, lies on mica-schist rock, and is covered by schist and in some places by limestone. There are also numerous masses of schist and limestone in the ore itself. The schist overburden being soft, is easily and cheaply removed. The workings have been carried to a depth of over 50 m.

The ore is sent down self acting inclined planes to the cable tramway station and is conveyed to the coast by means of a cable tramway, which is the longest in Spain. It is 15,656 m. in length and is on the double rope system. About 400 to 500 tons are conveyed by this ropeway per day of ten hours, and the cost is about 1.25 pesetas per ton. The ore is tipped at the terminus at Garrucha onto the beach, where a large stock is kept, and from this heap several tramroads run out onto small wooden jetties which project into the sea a few yards until a sufficient depth of water can be attained to enable the flat bottomed lighters to come alongside. These are loaded with baskets of ore, and carry about 60 tons each; they are then rowed out to the steamer, which lies about 400 m. from the shore, and the ore is hoisted on board. It is wonderful with what rapidity this work is carried out; as much as 2000 tons can be loaded in one day by these means at a cost of about 5 pence per ton.

The cost of the ore put on board ship is probably about as follows:

	Per ton.
Mining and traming to ropeway station	2.00
Carriage to Garrucha	1.25
Royalty	1.00
Putting on board ship, &c.	1.00
Management, &c.	0.50
Total	5.75

At the present rate of exchange this is equal to about 3 shillings and 5 pence per ton.

Besides the mines above described, there are many properties in private hands, among which are several extremely promising ones, containing hard lumpy hematite ore of excellent quality, but on many of which little development work has, up to the present, been done. There are also magnetite deposits which have not as yet been developed in any way.

The great impediment to the development of this promising district is the want of a railway. The question of making one has been discussed several times, and surveys have been made and tenders obtained. It is believed that a railway of 1 m. gauge, capable of dealing with a traffic of 800,000 tons per annum, could be built and equipped for about £60,000. A recent purchaser of mines in this district has expressed his determination to proceed at once with the construction of a railway and a loading pier at Garrucha; and that these works, as a necessary preliminary to the development of the mines, will be immediately carried out, there can be no doubt.

It may be confidently expected that on the completion of these works the export of iron ore from Garrucha will increase very rapidly, and that this port will become one of the most important in Spain as regards the shipment of iron ore.

It has been estimated by competent authorities that in only a limited number of the pertenencias of this district there are available upward of 7,000,000 tons of marketable iron ore.

The following analyses are typical of the iron ores of this district: No. 1 is the soft hematite, a large proportion of which is smalls; No. 2 is typical of the hard purple hematites of the district, and No. 3 is an analysis of the magnetites found in the Sierra de Bédar:

No. I.—Fine Garrucha Ore.

	Per cent.
Peroxide of iron	85.14
Peroxide of manganese	3.43
Oxide of lead	none
Oxide of copper	0.03
Alumina	1.32
Lime	1.63
Magnesia	0.43
Silica	4.80
Carbonic acid	0.70
Sulphuric acid	0.03
Phosphoric acid (0.017 per cent. phosphorus)	0.04
Arsenic	trace
Combined water	2.76
Total	100.11

Metallic iron, dry	59.66
Iron as received	55.87
Moisture	6.26

No. II.—Lumpy Garrucha Ore.

	Per cent.
Peroxide of iron	79.460
Peroxide of manganese	2.399
Alumina	0.274
Lime	2.340
Magnesia	0.544
Silica	7.250
Baryta (= 0.277 sulphuric acid)	0.420 = 0.111 sulphur.
Sulphuric acid	0.020 = 0.016 sulphur.
Phosphoric acid	0.036
Lead, cobalt, nickel	0.032
Arsenic, antimony	...
Combined water carbonic acid	7.040
Total	99.824

Iron in dry	85.622
Iron in raw	49.615
Manganese in dry	1.728
Manganese in raw	1.541

Sulphur.....	0.122
Phosphorus.....	0.016
Moisture.....	10.800

No. III.—Magnetite Ore from Sierra de Bédar.

	Per cent.
Peroxide of iron	71.7
Protoxide of iron.....	13.37
Peroxide of manganese	1.58
Alumina	0.35
Lime.....	5.26
Magnesia	0.36
Baryta.....	trace
Silica.....	1.45
Sulphur.....	0.03
Phosphoric acid	0.008
Oxide of copper	nil.
Oxide of zinc	0.06
Arsenic.....	trace
Carbonic anhydride	2.15
Combined water.....	3.70
Total.....	100.028
Iron in the dry.....	60.60

THE WEEK.

The estimates for the next fiscal year, prepared at the Interior Department at Washington, call for an appropriation of \$155,805,278.83 to carry on the work of the department, including payments for pensions in that period. This sum is over \$13,750,000 less than the appropriation for the current fiscal year, the decrease being mainly in the matter of pensions, for which \$10,000,000 less will be asked.

At the recent labor convention in Indianapolis it was proposed by the delegates representing the iron and brass workers of the United States to establish for their trades, in all the large cities, a central union of which all the various metal trade unions will be members. The idea is to make a sort of clearing house for the various iron and metal industries, where they may be brought into contact and through which they may take joint action on any question.

The Montreal (Canada) *Gazette* announces the formation of a new corporation in that city, whose object is to acquire the control of bankrupt estates, either by purchase or otherwise, and to realize the same in the most profitable manner possible. The Assets Company, which is the name of the concern, have a capital of \$200,000, and propose to hold weekly sales by auction for the disposal of merchandise acquired. It is understood that goods will only be sold in limited quantities at a time, so that stocks will not be disposed of *en bloc* to retailers, as at present. The main aim of the company is said to be, however, to prevent the breaking up of the markets by the slaughter of bankrupt stocks. The company will remove all merchandise which they purchase from the premises of the insolvents to their warehouse, where it will be put in salable shape and disposed of in lots, so that no dealer will become possessed of an estate to the injury of his neighbor. The operations of the company will be watched with great interest, and if the enterprise proves successful, it may be followed by the establishment of similar concerns in other cities of the United States and Canada.

The statistician of the Department of Agriculture, after an investigation of several months' duration, estimates the acreage of cotton planted in the United States in 1893 at 19,525,000, and the number of bales harvested at 7,493,000.

At a recent meeting of the Nebraska Banker's Association, held at Omaha, I. A. Ford, president of the State Irrigation Society, said that there are 10,000,000 acres of low lands in the State

of Nebraska that might be irrigated at an expense of \$2 per acre, and over 10,000,000 acres of high lands that might be watered at a cost not exceeding \$4 per acre. The meeting adopted a resolution in favor of the State irrigation system.

The cotton spinning industry is reported as making great strides in Japan in recent years. In 1887 there were in existence 24 mills, with 130,000 spindles, and in 1893 there were 48 mills, with 385,265 spindles. Manual labor being very cheap, the manufacturers are able to meet all outside competition, and the foreign imports of cotton goods are falling off materially every year.

According to Government returns recently published, the total imports into Japan in 1893 amounted in value to \$88,257,171, or \$17,000,000 in excess of 1892. The exports for 1893 were \$89,712,864, a falling off of \$1,389,890 from the previous year, and showing an excess of exports over imports of \$1,455,693. The principal exports were silk, rice and tea.

Official information received by the Bureau of the American Republics gives the sugar production of Cuba in 1893 as 755,860 tons. The crop in the present year is estimated at 1,056,050 tons.

A dispatch from Panama to the New York *Herald* says that President Bonaire has ordered an active resumption of work on the canal in behalf of the new Panama Canal Company.

President C. P. Huntington, of the Pacific Mail Steamship Company, says that negotiations are in progress between his company and the antagonistic steamship lines backed by the Panama Railroad Company, which he expects will lead to a peaceful settlement of the present rivalry. It is understood that the Pacific Mail will lease the Atlantic service to the Columbian Steamship Company, and that the Pacific Coast business will be surrendered to the Pacific Mail Line.

Great prairie fires have devastated the northwestern part of the State of Nebraska. A large number of ranches and thousands of head of cattle have been consumed by the flames.

The Board of Trade in Washington, D. C., has pronounced in favor of encouraging manufacturing establishments to locate in the national capital.

English advices intimate that the final liquidation of the great Baring estate will shortly take place. The liabilities, which were originally over \$100,000,000, have been reduced to a little over \$12,000,000. It is expected that a large surplus will be secured ultimately.

It is announced that Mrs. Cleveland, wife of the President of the United States, has consented to name the new Atlantic liner "St. Louis." The exercises attending the launch of the vessel from Cramp's shipyard, Philadelphia, will take place November 9.

Although this year's season for fast ocean records is supposed to be over, the Cunard liner "Lucania" has once more reduced the eastward transatlantic record, making her voyage from Queenstown to Sandy Hook last week in 5 days, 7 hours and 23 minutes, or 25 minutes less than her previous time, notwithstanding the fact that the vessel encountered strong northwesterly winds and heavy seas during part of the passage.

Herbert Praed, president of the Temescal tin mining syndicate, has recently made a careful investigation of the property in the interests of the English stockholders. He will advise, it is reported, the thorough prospecting of the mines for gold, as ore found in various places would, he believes, pay scientific working.

Shipping men in New York aver that imports of goods from other countries to this port have been steadily increasing since the coming into effect of the new tariff and that the movement is general from all parts. The amount of freight sent hither, while not excessively large, is decidedly larger than it was a few months ago. In illustrating this fact, the following figures are given by the *Journal of Commerce*: A certain steamer belonging to a regular line, coming from London, brought on a trip in May last 1416 tons of freight; in July the same ship brought 1451 tons and on her last trip this month she brought 2638 tons. Another ship in the Antwerp trade brought to this port in July 1475 tons of freight and on her last trip this month 1819 tons. Another vessel from Hull brought 550 tons in July and 1600 tons in October. Some of this business in October is accumulative business—that is, freight has been piling up waiting for shipment—but the increase is still noticeable.

It is calculated the Government expenditure for the month of October will exceed receipts by nearly \$10,000,000.

The German Government has forbidden the importation of American cattle.

The general freight agent of the Pennsylvania Railroad system west of Pittsburgh states that the freight traffic on his lines is steadily increasing, and the demand for empty cars is becoming so urgent that there are hardly any available on the system at present.

The benefit of ship canals in promoting the commercial prosperity of cities is becoming widely recognized in this country. Philadelphia, Cincinnati, Pittsburgh and other commercial centers are actively pushing projects for the construction of such waterways to those cities.

Some time since a leading merchant in Africa, who is an extensive purchaser of hardware, visited this country. Incidentally the low price of American bar iron was brought to his attention. The result has been that a trial order for bar iron for export to Africa is about to be given out.

A press dispatch from New Lisbon, Ohio, reports that while Newton, Johnson & Co. were sinking an oil well in Union Township, Carroll County, that State, the drill passed through a vein of lead several feet in thickness 45 feet below the surface. Directly beneath the lead was found a vein of zinc 14 feet thick. It is said the lead assays 65 per cent, and the zinc 70 per cent. There is said to be great excitement in the locality where the find was made, and preparations are being made to mine the minerals.

Donaldson Brothers, steamship owners, are about to run a freight line of steamers between Boston and Bristol, England.

The Iron Age

New York, Thursday, November 1, 1894.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - HARDWARE EDITOR.
JOHN S. KING, - - BUSINESS MANAGER.

The Importance of Technical Improvements.

Technical improvements in manufacturing do not receive that consideration in the commercial branch of an industry which they merit. Passing phases relative to demand and supply are closely watched and really do possess greater significance so far as the immediate future is concerned. They lead to fluctuations in values far greater than the reductions in cost due to marked improvements in practice during a limited period. A correct judgment as to the temporary influences shaping values is therefore far more directly and obviously remunerative. The commercial management can make a greater impression as to success and merit.

In a general way the statement is justified that technical progress as expressed in cost sheets and less readily measured in quality of product is cumulative. Every saving in labor or in fuel, every reduction in waste, represents a permanent gain. Once established in the particular practice of a works, it is an advantage very rarely lost, because usually the *personnel* of an establishment is numerous enough to prevent its abandonment by the departure of one or a few managing men.

In most cases the progress attained in this direction is the result of small improvements. It is indeed rare that some revolutionary change brings with it some extraordinary reduction in cost or betterment in quality. The natural result of development by small increments is that it escapes the attention of those who are chiefly busy in watching the commercial end. We venture to say that very few Southern furnaces would have escaped bankruptcy during the past two years if they had stood still where they were in their practice in 1892.

The cumulative reductions in cost lead to ability to market product at prices astounding to the uninitiated. In the bar trade, for instance, the introduction of continuous mills threatens to bring about a permanently low range of values. With mills turning out in one heat from the ingot steel billets as small as 1 1/4-inch square, at an advance in the asking price of about \$1.50 to \$2 per ton over 4-inch square billets, it does not call for much additional work to produce finished bars. Under the circumstances 90 cents per 100 pounds, at mill, for large lots of standard sizes allows a modern mill to escape without loss.

Great economies have been secured through the introduction of labor saving appliances and through a persistent following of the principle that improvements influencing the conditions surrounding work lower the labor cost. Every record of increased product of a unit of plant represents a permanent chipping off of general expenses and special costs. Few would have believed it possible four or five years ago that the labor cost of converting pig iron into billets could be crowded down below \$1 per ton, an achievement of which some mills can now boast.

The stress of the hard times has unquestionably led to a closer study of manufacturing appliances and practice. Many concerns who have jogged along on old lines, with fair prosperity, have been rudely awakened to the fact that rivals in different parts of the country have outstripped them. Until lately real or fancied superiority to neighboring competitors gave a sense of security. We have often noted with much astonishment the indifference concerning developments in distant sections which characterized manufacturers and merchants. That is changing wonderfully now. Many are learning that local events are not the only ones which affect their welfare, and henceforth interest in technical developments and progress will be far more truly national than it has yet been.

Special Tools and Dull Times.

A peculiarity of dull times, with their resulting sharp competition, low prices and meager demand, has always been the fostering of special machines and appliances of every description. At such periods there is a vigorous call for tools that will produce more of a certain article; that will do the work better, and that will require less attendance. This is true even though, as now, wages have been reduced to a low level and the price of raw materials has struck bottom. In modern times there is, of course, a constant cry for special tools, but there is an uncommon impetus given to this demand during a period of stagnation. When the demand for any product is in excess of the output, and prices are such as to yield the maker a handsome profit, then it is only the progressive and aggressive manufacturer who thinks of the advisability of perfecting his equipment by the introduction of special machinery designed to do his particular work. Those builders who follow in the rut, taking no thought of the changes to be wrought by the morrow, rest contented with things as they are. The result is that when prices fall and trade nearly vanishes, the progressive man controls the market because of the facilities he possesses. He also has the experience and skill and can cope with reverses. His neighbor has two courses open to him: to perfect and bring his plant up to standard, or to attempt to meet the reduced prices by the use of inferior

material or cheap and unskilled labor. He has not time, and perhaps not money enough, to accomplish the former, and therefore he, of necessity, has recourse to the latter.

During periods like this the shop and business methods of the progressive man assume the greatest prominence. Invariably the establishments watching for and anxious to obtain special appliances are those in which the best shop methods prevail and where the business department is managed well. The same spirit pervades and animates each branch of the concern, and from an inspection of one of them an accurate estimate can be formed of the composition of any other. A collection of tools in the shop, fit only for the scrap heap, means an aggregation of beings in the office for whom, unfortunately, there is no scrap heap in this world.

The Anthracite Coal Trade.

It seems hardly credible that a body of business men should profess to have taken action like that attributed to the managers of the anthracite coal carrying roads. For a long time they have claimed to have arranged monthly for a restriction of production, in order to make it possible to maintain prices. Last week they came together and solemnly decided to remove all restrictions as to output. Almost in the same breath they decreed that there shall be an advance in circular prices. If the assumption that people are "mostly fools" be an indication of a cynical turn of mind, then the anthracite coal managers stand unsurpassed as a group of cynics.

There has always been a flavor of opera bouffe about the gatherings of these men. The so-called circular prices have been a farce for a good many years. Of course it has always been either the wicked individual operator or the wily merchant who has been guilty of selling at cut prices. The immaculate sales agent has held to the list born in monthly conference. He might suspect that one of his rivals had a close alliance with some firm of merchants in the same corridor of some great office building, but he himself was free of such entanglements. Yet this play of virtue has been going on for years with cheerful monotony. The only part in it which had any shadow of serious interest was the constant effort to keep production within reasonable bounds. We question whether the agreements as to tonnage were ever fully kept during any time in the last few years, but even the partial adherence to the spirit of the pool prevented disastrous demoralization. And now even that is cast to the winds and a credulous public is asked to listen patiently to talk of an advance in prices. Americans are quick to take a joke, but are not slow, either, to resent the ridiculous.

We notice that some financial writers have found, with much show of wisdom, that the condition of the iron

trade has much to do with developments in the anthracite coal trade. The world is told, on the authority of *The Iron Age*, how much less pig iron is being made than there should be in normal times. As a matter of fact, the consumption of anthracite coal in the iron trade is now a very insignificant one, since the majority of furnaces use considerable coke in the burden. We question whether it is 15,000 tons per week. In the rolling mills gas coal is used in producers, and to some extent oil has replaced the hard fuel. General demoralization in the anthracite trade would not, in our opinion, aid the plants of Eastern Pennsylvania much through a lowering of cost. The days of a wide use of that precious fuel are drawing to a close rapidly. In the future the manufacturing industries of New England, New York, New Jersey and Eastern Pennsylvania will be found to depend mainly on those very small sizes which we are only now learning to utilize. Domestic consumption will, to even a much greater extent than now, be the mainstay of the anthracite coal trade.

PERSONAL.

Philip Lange, who has been superintendent of the Newark branch of the Westinghouse Electric Mfg. Company, has been appointed general manager of the new works at Brinton, Pa.

Thomas P. Egan, president of J. A. Fay & Egan Company, Cincinnati, Ohio, has purchased a controlling interest in the Cincinnati *Commercial Gazette*. Mr. Egan, who as a young mechanic of foreign birth was not long since working at a lathe in Cincinnati, is now at the head of the largest concern manufacturing wood working machinery.

J. R. Worcester has established himself as consulting engineer at Boston, Mass. He has been chief engineer of the Boston Bridge Works for a number of years.

T. R. Morgan, Sr. of the Morgan Engineering Company, Alliance, Ohio, has only recently returned after a three months' absence from Europe.

James M. Swank of Philadelphia, secretary of the American Iron & Steel Association, was a visitor in Pittsburgh last week on business connected with that organization.

Abram S. Hewitt of Cooper, Hewitt & Co., New York, sailed from Liverpool for home last Saturday. Andrew Carnegie sailed on the same day.

A banquet is to be given in New York on Thursday, November 8, to E. Windsor Richards, president of the Iron and Steel Institute, and general manager of the famous Low Moor Iron Company. About 75 representatives of the iron trade of the country will participate, a preliminary circular having been sent out, signed by Edward Cooper, Walter Scranton, George A. Crocker, John Fritz, and C. Kirchhoff. While the American members of the Iron and Steel Institute have taken the initiative in the matter, invitations have been extended and have been accepted by many leading iron masters and engineers not connected with the institute. An interesting incident of the gathering will be the presentation, by E. Windsor Richards, of the Bessemer

medal to John Fritz of Bethlehem. When the medal was awarded last year Mr. Richards promised to present it personally. We understand that although the golden token has been in this country for over a year, the recipient has not yet seen it.

The Mikado of Japan has sent the decoration of the Rising Sun to Lieutenant W. H. Jaques, in recognition of the courtesies and assistance given by him to Japanese officials while inquiring into the construction of war material in the United States.

James A. Burden of Troy sails for home on the 3d inst.

Ambrose Beard, Sr., recently of Swansea, Wales, has been appointed superintendent of Irondale Steel & Iron Company's tin mills at Middletown, Ind. Mr. Beard is an uncle of Ambrose Beard, Jr., general manager of the Morton Tin Plate Company, Cambridge, Ohio.

The Naval Architects.—The second general meeting of the Society of Naval Architects and Marine Engineers will be held on Thursday, November 15, in the rooms of the American Society of Mechanical Engineers, 12 West Thirty first street, New York. The following papers will be read: "Some Suggestions of Professional Experience in Connection with the Naval Construction of the Last Ten Years—1884-1894," by Richard W. Meade, Rear Admiral, United States Navy. "The Use of Small Models for the Determination of Curves of Stability," by Mon. E. Bertin, Director of the French Government School of Naval Design. "Some Obstacles to Shipbuilding and Owning in this Country," by Geo. W. Dickie, Naval Architect, San Francisco, Cal. "Present Status of Face Hardened Armor," by W. T. Sampson, Captain and Chief of Ordnance, United States Navy. "Cellulose and Its Application to Warships," by Mon. E. Cheneau, Philadelphia, Pa. "Experience Gained with Our New Steel Ships as Regards Care and Preservation," by Philip Hichborn, Chief Constructor, United States Navy. "The United States Triple Screw Cruisers 'Columbia' and 'Minneapolis,'" by George W. Melville, Engineer-in-Chief, United States Navy. "Electricity on Shipboard—Its Present Position and Future Development," by S. Dana Greene, New York, N. Y. "Hydraulic Power for Warships," by Albert W. Stahl, Naval Constructor, United States Navy. "Yachts in England and America," by Lewis Nixon, naval architect, Philadelphia, Pa. "A Dynamic Steam Engine Indicator Tester," by Prof. Cecil H. Peabody and Ass't. Prof. E. F. Miller, Massachusetts Institute of Technology. "Steamer and Tow Barge Efficiency and Classification of Lake Vessels," by Jos. R. Oldham, naval architect, Cleveland, Ohio. "Notes on Launching," by William J. Baxter, Naval Constructor, United States Navy. "Accessibility and Circulation of Water Tube Boilers," by L. D. Davis, M.E., Erie, Pa. "Recent Light Draft Gunboats of the United States Navy," by J. J. Woodward, Naval Constructor, United States Navy. On Friday evening, November 16, the members and their guests will participate in a banquet at the Hotel Brunswick.

The introduction of dynamite and other explosive substances into Venezuela is prohibited by a recent decree of the President of that State.

Washington News.

(From our Special Correspondent.)

WASHINGTON, D. C., October 30, 1894.

The Iron Age is enabled to give from official sources an abstract of the principal features of the proposed torpedo boats 3, 4 and 5, not shown in the technicalities of the formal specifications for the use of bidders and builders. The chief, Commodore Melville, referring to this subject, said: "There are some new features in the machinery of torpedo boats 3, 4 and 5 which are thought to be improvements over that placed in the 'Ericsson,' to which we might call attention. The machinery is arranged so that each of the main engines, together with all its auxiliary machinery, is placed in a water tight compartment of its own. This reduces to a minimum the chances of being disabled by an unlucky shot. At first sight this arrangement would appear to be very wasteful of space, but such is not the fact. Compared with the 'Ericsson' the total length occupied by the engines and boilers is 64 feet 6 inches, against 61 feet 6 inches in the latter boat. From this it will be seen that only 3 feet more in length is required for 2000 indicated horse power than was used for 1800 indicated horse-power in the 'Ericsson.' Another great advantage of this arrangement is the ease and safety with which the machinery can be attended when in use. In the one case we have only a narrow passageway with a high speed engine on either side, making the least careless movement dangerous to life or limb, while in the other case there is moving machinery on only one side. There is a water tight door in the bulkhead between the two engine rooms. The starting and reversing gear for each engine is near this door, thus making it possible for one man to handle both engines when working under the usual conditions. When going into action this door would be closed and all hands would be put on duty.

"The first requisite of torpedo boat machinery is lightness in proportion to its power. This lightness is secured by using only the very best of materials and running the machinery at the highest speed consistent with safety. One of the greatest obstacles to high speed is the vibration caused by the inertia of the moving parts. These weights must be reduced to the minimum consistent with proper strength. In order to do this all the piston rods and connecting rods have been made hollow, for hollow rods have the maximum rigidity and strength combined with extreme lightness. Four cylinders were adopted instead of three to secure a better running balance, thus reducing the vibration as much as possible. The high pressure and intermediate pressure cranks, as well as the two low pressure cranks, are placed opposite to each other, each pair being placed at right angles to the other pair. The cylinders have been placed as close together as possible consistent with keeping them in the same vertical plane. This is done to prevent the vibration due to couples formed by one piston going up while the other is coming down. These couples often cause the most serious vibrations especially if the engines happen to be placed at the nodal points of the hull's vibration.

"Triple expansion engines were adopted instead of quadruple ones chiefly for the sake of lightness and

compactness, and to avoid the large low pressure cylinder which would be required if only four cylinders were used. The adoption of a quadruple expansion engine might have resulted in a slight increase of economy, but in the absence of experimental data it is not believed that this gain would have warranted sacrificing the manifest advantages of the triple expansion engine. A quadruple expansion engine with two low pressure cylinders would require five cylinders instead of four as in the design adopted. Inertia curves were constructed, and it was found that less vibration would actually be produced by the four cylinders than by five when the cranks were placed at satisfactory angles in each case. The high pressure and intermediate pressure are both made in one casting, while the two low pressure cylinders form another casting. These two castings are firmly bolted together and really take the place of a bed plate for resisting vertical strains.

"The real bed plate is a plate of steel $\frac{1}{8}$ inch thick upon which the cast steel crank shaft pillow blocks are bolted. The holding down bolts pass through the pillow blocks, the bed plate and ship's frames (which are properly spaced for this purpose), thus making the engine bed plate and the hull one continuous structure. The frames are braced only in an athwartship plane, but blank places are left to secure fore and aft braces should they be found necessary.

"The valves have been placed upon the sides of the cylinders and so arranged as to make as short and direct passages as possible. They are all of piston type. The high pressure cylinder has one; all the other cylinders have two valves each. The valves are worked from a separate valve shaft driven by gearing from the main crank shaft. The engines are reversed by a movable sleeve so arranged with spiral feathers and grooves that a rotary motion is imparted to the valve shaft when the sleeve is moved fore and aft. The blowers, which discharge into air tight fire rooms, are driven by compound engines. The cylinders of these engines are placed opposite. Their moving parts will be of equal weight and work on opposite cranks. These engines, as well as all the other auxiliaries, will exhaust into the low pressure receivers. This practically converts the compound blower engines into triple expansion ones. The blowers are usually driven by simple engines; as they use large quantities of steam the saving due to the increased economy of triple expansion engines should be of considerable importance. To lower the temperature of the fire room and make it more comfortable, a door will be fitted in the back end of the ash pan in addition to the one usually fitted in front. The front door can be closed whenever desired and the back one opened. This will cause all the air to pass over and around the boiler before entering the ash pit, thus sweeping all the heat into the furnace instead of allowing it to radiate into the fire room. The type of boiler has not been decided upon further than that it will be of the coil or tubulous variety. Ample weight has been allowed to provide a good durable boiler of this type."

Engineer-in-Chief Melville is very decided in his views upon the unsuitability of aluminum for the manufacture of parts of steam machinery. He remarked to-day, when the subject of a test of sheets of the metal in sea water and the unusual amount of fouling was being discussed: "Aluminum is a failure for

steam machinery where great strength and exposure to a certain amount of heat are required, as it does not stand heat and has not the strength we demand. It may combine lightness with strength for light uses, but at this stage of its development it cannot be relied upon for the enormous strain put upon steam engine machinery in these times." In referring to the construction of aluminum torpedo boats, the sagacious chief added: "It's a mistake and you will find it so when these boats get into service."

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, October 24, 1894, at Room 701, Western Union Building, Chicago, Ill. In the absence of the president and vice-president, John M. Sweeney occupied the chair. Those present were the following: Thomas Snow, Challenge Feed Mill & Wind Mill Company, Batavia, Ill.; H. S. Vrooman, Garden City Sand Company, Chicago; E. C. Greenlee, Greenlee Foundry Company, Chicago; F. B. Whitcomb, Chicago; F. W. Sargent, The Sargent Company, Chicago; G. D. Chamberlain, Chicago; Wm. M. Wing, Hoyt & Bros. Company, Aurora, Ill.; E. H. Walker, Emerson, Talcott & Co., Rockford, Ill.; L. Wolff, Jr., C. J. Wolff, L. Wolff Mfg. Company, Chicago; C. S. Reed, Chicago Retort & Fire Brick Company, Chicago; John T. Rowland, J. I. Case T. M. Company, Racine, Wis.; Alfred D. Edwards, John Bailey, Illinois Iron & Bolt Company, Carpentersville, Ill.; W. C. Waterbury, Forster, Hawes & Co., Chicago; S. T. Johnston, Whiting Foundry Equipment Company, Chicago; A. W. McArthur, Rockford Foundry Company, Rockford, Ill.; O. T. Stantial, Illinois Malleable Iron Company, Chicago; George O. Ware, Sibley & Ware, South Bend, Ind.; Chas. Shepard, William I. Baker, Buda Foundry & Mfg. Company, Harvey, Ill.; John M. Sweeney, Chicago; E. W. Smith Crane Company, Chicago; and B. M. Gardner, Chicago.

The following candidates for membership were unanimously elected members of the Association: L. Wolf Manufacturing Company, Chicago, Ill.; C. H. Woodruff Company, Elgin, Ill.; Chas. Johnson of Howe Scale Company, Rutland, Vt.; Foster Hawes & Co., Chicago, Ill.; East Chicago Foundry Company, Chicago, Ill.

The secretary then read a paper on "Comparison of Strength in Specialty Mixtures of Cast Iron," by Thomas D. West, which we print elsewhere.

After the reading of the paper the test bars were handed around and examined by the members and a general discussion followed.

Mr. Snow: Mr. West evidently considers a $\frac{1}{8}$ -inch bar a fraud and that all of us that have been trying to make them have been laboring under a delusion.

Mr. Stantial: He says that a $\frac{1}{8}$ -inch bar would show better in stove plate iron than in a harder iron.

Mr. Bailey: Test bars as a rule are better for comparative results. You may test two bars and one will show great tensile strength and elasticity and the other will show the reverse, and at the same time there will not be any visible difference in the work.

Mr. Stantial: My experience with test bars is as you say. One bar may break

at 2000 pounds and another at 2200, made of the same mixture.

Mr. Bailey: You will never find any two sets of bars the same, although the mixture is the same all the way through.

Mr. Stantial: You find the bars in the middle of the heat stronger, do you not?

Mr. Bailey: Not always. The last are sometimes the strongest. We often find, where iron is not mixed properly, a strata of chilled iron in the last part of the heat.

Mr. Wing: My class of work is machinery castings. We use an old-fashioned iron bar for getting a comparative test. We get a car of iron this month and we test it; and next month we get another and test it to find if it is up to grade. We have always been satisfied with our tests.

Mr. Sweeney: What sized bar do you use?

Mr. Wing: I think $5\frac{1}{2}$ inches, square at each end and turned down $\frac{1}{2}$ inch in the middle. We twist it off with a 5-foot lever. We think it ought to give a good comparative test in regard to strength.

Mr. Sweeney: I suppose there is no question as to comparative test; but it gives you no data. That is pre-eminently the object of test bars. The nearer the test bar corresponds to the characteristics of the casting the more valuable it is. I think Mr. West has prepared for that phase of the subject when he remarks in the paper that he expects later to present another paper on this subject of test bars. The difference between a test bar cast in green sand or in dry sand seems to have a considerable bearing when it comes to the comparative strength.

Mr. Walker: We are using the Riehl Bros. testing machine and test two pairs of bars. Of course these bars vary, but we get a very good test. They are square bars cast flat, and there is not a difference of 200 pounds in any week's test. They are 12-inch centers and they have not varied 200 pounds in the last two weeks. We take the bars, one at the third tap and the other at the last half of the heat, and the last bar is the stronger.

Mr. Snow: Mr. West makes the assertion that the round test bar is about the right thing and gives some reasons why the square bar is not as good as the round.

Mr. Stantial: The tests seem to show that the round bar is more regular than the square, and that ought to seem natural at the first glance, as in the square bar there are four corners that are subject to flaws and changes, and this would not be true with the round bar.

Mr. Wolff: We take tests with 1-inch square bars. We cast our bars from the top—that is, we pour the iron right into the top of the bar and cast them upright, and as a rule get a very good class of iron, free from flaws. The bar is made long enough so that the 2 inches at the top do not need to be included in the test.

Mr. Shepard: Have you ever observed that a casting containing a flaw in the fracture would sometimes be better than one without the flaw?

Mr. Walker: I have had that experience twice. In one instance the bar was exceptionally strong.

Mr. Wing: I have invariably found a bar poured hot stronger than a bar poured cold.

Mr. Rowland: The hotter I pour the greater the strength every time. I have had some arguments on that point with a brother foundryman. He claimed

that the one he chilled was the strongest. I have found as much as 200 pounds difference in iron poured out of the same ladle.

Mr. Bailey: I have found it so also.

The secretary read an article by Alexander Cairns of Detroit criticising Mr. West's system of test bars, and Mr. West's reply to Mr. Cairns, both taken from the *American Machinist*.

Mr. Wing: What sized bar is used mostly now?

Mr. Stantial: Twelve inches between supports is the most popular, but I am using a 2 foot bar. If the 2-foot bar breaks in a flaw I have a 1-foot bar left for the test.

Mr. Wing: Then you would record two tests?

Mr. Stantial: Yes, with the same bar.

Mr. Vrooman: Would it not be a good plan to weigh the bars and see if the difference in weight would not be the cause?

Mr. Stantial: Mr. West says the conditions should be the same in the two bars.

Mr. Shepard: At the same time you know by experience that the two similar bars will break at a different weight.

Mr. Sweeney: I have used test bars in my practice for a great many years and have found them very valuable. I can see that where the work is the same each day the value of the test bar disappears to a great extent. In one class of work a test bar may be of greater value than in another class.

Mr. Stantial: My experience has been that the test bars vary and I would not want to buy iron by the result of test bars.

Mr. Bailey: I am governed every day by test bars.

Mr. Sweeney: When you add a laboratory to your test bar business you will be all right. That is one thing I am anxious to see as a result from this organization. It will accomplish a very great good to all persons who handle cast iron or melt it in cupolas.

Mr. Rowland: I always use a test bar in my practice, as it tells better than anything else whether the cupola man is doing his work all right or not. Every time I can catch him on the test bar.

Mr. Shepard: What reason have you to account that the middle heat gives the greatest strength?

Mr. Walker: I do not know. I have no theory. It is simply a matter of my experience. The test bar taken from the first or second tap is generally the weakest and the test bar taken from the end of the heat is generally weaker than that taken at the middle.

Mr. Stantial: I had an experience of over two years in making square test bars. We took four test bars in a heat and invariably the first bar was from 200 to 400 pounds weaker than the following bars.

Mr. Sweeney: Did you use scrap in these charges?

Mr. Stantial: Yes, there was some scrap used.

Mr. Sweeney: What was its character, light or heavy?

Mr. Stantial: It was first class machinery scrap.

Mr. Sweeney: Is it possible that the scrap could have come down first, and in that way affected the test bar?

Mr. Stantial: It would seem more that it was the lining in the cupola, or the lining of the ladle or something like that.

Mr. Shepard: You never poured the first iron into the best work?

Mr. Stantial: No. At that time we

used to favor the first charge. If anything I would make a better mixture for the first charge than for any other charge.

Mr. Shepard: Do you not think you get more sulphur in the last end of the heat?

Mr. Stantial: I have taken the stand before that we get more sulphur in the first part of the heat through the bed. I have followed that up by chemical analysis and found that I was right.

New Machinery for the "Chicago."

Congress having made special appropriation for the purpose of building new machinery for the "Chicago," the Bureau of Steam Engineering has perfected plans for it, and the work of construction has been commenced in the New York Navy Yard. In preparing these plans it has been the aim of the bureau to design machinery that can be placed in the vessel without cutting or removing the protective deck or any of the principal framing, and also to utilize as much of the present machinery, in the way of shafting, pumps, blowers, &c., as possible, thereby greatly decreasing the cost of manufacture and installation.

The new engines will be slightly inclined, triple expansion, and designed for 9000 indicated horse-power. About one-half the power is to be obtained from Scotch or cylindrical boilers, made single ended that they may be lowered through the present openings for uptakes, &c., and the other half from tubulous or pipe boilers.

The new machinery will weigh considerably less than the old, and the smaller space occupied by it will allow the coal capacity to be increased 100 tons. The speed of the vessel will be increased 3 knots and the radius of action about 22 per cent.

A Wonderful Record.

The annual report of Geo. W. Melville, chief of the Bureau of Steam Engineering, U. S. N., contains the following statement, which bears evidence of the truly wonderful work done by this department:

In all its designs for machinery, whether for a tug, a battle ship or a cruiser, the bureau has, in spite of much adverse criticism, insisted on a fair proportion of weight for power, especially in the boilers; as a consequence the department has been spared the annoyance of failures on trial trips; and, without exception, all machinery built from its designs has done all, and more than all, that was required of it on the first trial, and without distress, accident or injury of any kind. Such a record is unique, and, when the high powers and unprecedented speeds of some of the vessels are considered, it is one to be justly proud of.

In the opinion of the bureau, much of this success is due to its uniform practice of allowing ample power for the speed required with a given displacement, as determined from the carefully observed performances of similar vessels, and to having every design, before final adoption, carefully scrutinized by an engineer officer who has performed service at sea in charge of machinery, this being the only way in which much of the information absolutely essential to the successful designing engineer can be obtained.

Important Advances in Freight Rates.

From Chicago comes the information that some advances in freight rates, on articles of iron and steel manufacture, were decided upon at the recent meeting of the Central Traffic Association held in that city. The advanced rates apply from Pittsburgh and points taking Pittsburgh rates, and are on articles of iron and steel manufacture, which now take fifth class in carload lots and fourth class in less than carloads. Heretofore Pittsburgh has been on what is known as the 40-60 per cent. basis, or, in other words, freight rates from Pittsburgh to Chicago and other Western points of shipment have been on the basis of 40 per cent. of the through rate from New York, the line making the haul from New York to Pittsburgh getting 60 per cent. of the through rate. At the meeting of the Central Traffic Association above referred to it was decided to put Pittsburgh on a 50 per cent. basis, or in other words, make the same rates apply from Pittsburgh to Chicago as apply from New York to Pittsburgh. The new rates from Pittsburgh to all the Western points of shipment have not been agreed upon as yet, but we present below the new rates to a number of the principal points of shipment, as follows:

Rates on Articles of Iron and Steel Manufacture.

	Pittsburgh to.	Carloads.	Less than carloads.
		Cents.	Cents.
Chicago.....	18	(17½)	21 (20)
Cincinnati.....	15	(15)	18 (17)
East St. Louis.....	22½	(22)	26 (25)
Cleveland.....	10	(9)	13 (13)
Detroit.....	15	(14)	18 (16)
Toledo.....	13	(14)	16 (16)

In the above column the first figures give the new rates which become effective December 1, while the rates now in force are shown in parentheses. The different lines affected by the change in rates are now at work on the new tariffs and they will probably be ready for distribution to shippers about the 15th inst.

The Mechanical Engineers Test Bars.—It will interest our readers to know that the 4 tons of test bars made by W. J. Keep for the Committee on Standard Tests are being tested by Prof. R. C. Carpenter of Cornell University and by Prof. C. H. Benjamin of Case School of Applied Sciences. A full chemical analysis of each set of test bars is being made by R. N. Dickman of Cleveland and by Dickman & Mackenzie of Chicago.

At the recent meeting of the Harvey Steel Company of Great Britain, Limited, held at London, a dividend of 8 per cent. was declared. Edwin M. Fox, who has managed the introduction of the Harvey process abroad, announced that the following Continental works have taken Harvey licenses: Creusot, St. Chamond, Chatillon et Commentry, Marrel Frères, St. Etienne, all in France; Dillingen and Krupp in Germany, and Witkowitz in Austria. The managers of the Harvey process are now beginning to turn their attention to the question of treating by it parts of machinery subject to rapid wear.

What is probably the largest armor plate order ever given out was placed by the English navy with Cammell, Brown and Vickers. The amount involved is 12,500 tons, the whole of which is to be treated by the Harvey process.

MANUFACTURING.

Iron and Steel.

The Pittsburgh Wire Company of Pittsburgh, with works at Rankin, Pa., manufacturers of wire rods and wire, are negotiating for the purchase of about 100 wire nail machines. In case the purchase of these machines is consummated, the above concern will enter the market as sellers of wire nails.

The Canton Rolling Mill Company, Canton, Ohio, turned out 105 tons of finished sheets in six days recently. The average output for their two-mill plant is 75 tons per week. The members of the above concern and most of the employees are sheet mill workers who were formerly employed at Apollo, Pa., and Leechburg, Pa., but lost their positions by going on a strike.

The Beaver Tin Plate Company have been organized, and will erect a six-mill plant at New Lisbon, Ohio. The main building will be of brick, three stories high and 180 x 120 feet superficial area. The contract calls for the completion of the building late in December, and operations are expected to be commenced about February 15, 1895.

The W. Dewees Wood Company, McKeesport, Pa., manufacturers of patent planished sheet iron, have commenced the erection of a new iron building to take the place of an old frame one. The erection of this building gave rise to the report that some extensions were being made to the plant of this firm, which report is untrue.

The Carrie Furnace Company of Pittsburgh, operating the two Carrie furnaces, at Rankin, Pa., have voluntarily increased the wages of their day laborers from \$1.05 to \$1.20 per day.

In one turn of eight hours last week, there was turned out in the Bessemer steel plant of the Shenango Valley Steel Company, New Castle, Pa., 248 tons of billets. The highest previous record for the above specified time was 232 tons.

The Schiffler Bridge Company of Pittsburgh have received a contract from the Chicago, Burlington & Quincy Railroad for the erection of a railroad bridge in Illinois. The same concern have received a contract from the Johnson Company of Lorain, Ohio, for the erection of a converter building, and from the Scottdale Iron & Steel Company, Scottdale, Pa., they have an order for the erection of a foundry building.

Week before last Grace Furnace of the Brier Hill Iron & Coal Company, Youngstown, Ohio, turned out about 2000 tons of Bessemer pig iron, the best run for a single day being 300 tons. This is claimed to be the best record for production ever made by a single blast furnace in either the Mahoning or Shenango Valley.

The continuous mill in the American Iron & Steel Works of Jones & Laughlins, Limited, Pittsburgh, for rolling billets, merchant bars and shapes, recently turned out 286 tons of 1½-inch billets in 12 hours. This mill was built by the Morgan Construction Company of Worcester, Mass., builders of rolling mills and wire machinery.

Zug & Co., Limited, of the Sable Iron & Nail Works, Pittsburgh, are erecting two new sheet mills and a stand of cold rolls, which will be driven by 36 x 60 engine, built by Mackintosh, Hemphill & Co. of Pittsburgh. The contract for the erection of the building, which will be of iron, has been given to the Schiffler Bridge Company of Pittsburgh. The new plant will be located on the site of the cut nail factory of this concern, which has been dismantled.

The new tin plate plant of Goldsmith, Lowenberg & Co., to which reference has already been made in these columns, will be located in New Kensington, Pa., on the Allegheny Valley Railway, about 20 miles from Pittsburgh. The main building will be 105 x 170 feet in size and will be built entirely of steel, the Schultz Bridge & Iron Company of Pittsburgh having the contract for its erection. The plant will embrace eight hot mills, eight cold mills, eight doubling and four squaring shears, together with 16 tinning stacks. The contract for the machinery has been given to the Frank-Kneeland Machine Company of Pittsburgh, while Gustave Kaufman is consulting engineer. The tinning house will be built entirely of brick, as will also the boiler house, which will be 30 x 60 feet in size. The plant is expected to be ready for operations within three months from date.

It is reported that further important additions are to be made to the armor plate plant of the Bethlehem Iron Company, at South Bethlehem, Pa. Two large open hearth furnaces are to be added to the four now in place, and a great plate rolling train is to be installed in the same building. A part of the foundations of the plate mill were laid years since in another building.

It is announced that the Middleport Steel & Nail Works of the King, Gilbert & Warner Company, Columbus, Ohio, are to be removed from Middleport, Ohio, to Columbus, where a complete, modern plant will be erected. The plant contemplated consists of a converter house, 85 x 100 feet, with two converters; a cupola house, 54 x 33 feet, with three 8 feet cupolas; a blooming mill, 161 x 85 feet; an engine, pump and dynamo house, 50 x 70 feet; a refractory and crushing house, 40 x 100 feet; a boiler house, 45 x 150 feet, with 20 boilers; a gas producer house, 35 x 65 feet, with five gas producers. In addition to these the company will erect a rolling mill, 100 x 110 feet. Five of the buildings are to be of iron and the remainder of brick and iron combined. There will be a complete chemical laboratory, a repair shop, and the city offices of the company will likewise be located on the site. The erection of more finishing mills in the near future is said to be contemplated by the company. The foundations and track and brick work will doubtless be put in this fall, while the iron work will be placed during the winter. The company are now negotiating for a site, and if this can be satisfactorily arranged at once the work of erecting the new works will be pushed forward as rapidly as possible.

The plant to be built at Ogden, Utah, by the Utah Furnace & Mfg. Company will consist of a charcoal blast furnace, 55 feet high and 11-foot bosh, equipped with a rack and pinion hoist, iron stoves, and a 6-foot vertical blowing engine. There is also to be built a pipe foundry capable of turning out 30 to 40 tons per day, and a general foundry and machine shop. The company are now negotiating for a small merchant mill and with a stove foundry.

Wm. A. Atkins and Sidney B. Briscoe, receivers, have filed a statement of the assets and liabilities of the Pottsville Iron & Steel Company, Pottsville, Pa., as shown on the books of the company on August 24 last, the date the assignment was made. The statement is given below:

Assets.

Real estate and improvements cost as shown on the books of the company August 24, 1894:

Real estate and Pioneer Furnaces.	\$287,460.25
Real estate, Pottsville Rolling Mill.	404,737.41
Real estate, P. & R. mill, steel plant and B. mill.	193,485.69
Real estate and P. & R. mill and bridge shop.	44,884.14
Real estate and Staten Island ore property.	10,806.90
Due to the P. I. & S. Company by sundry persons as shown on the books of the company.	86,700.01
Stock and bonds—\$33,000 of these bonds are pledged as collateral.	33,157.77
Stock account, personal, at Pioneer Furnace.	10,419.00
Stock account P. & R. mills.	10,771.07

STOCK ACCOUNT.

Finished iron and steel, pig iron, steel billets, scrap, coal, &c., on hand.	93,608.12
Bonds of the Pottsville Iron & Steel Company held by them.	16,700.00
These bonds are pledged as collateral.	
Estimate of the accounts due uncollectable at present.	45,972.66

Liabilities.

Accounts the Pottsville Iron & Steel Company owe to sundry persons:

For merchandise.	\$77,350.89
For borrowed money, int.	32,185.24
For taxes.	5,101.90
For pay roll and salaries.	25,180.11

BILLS PAYABLE.

Note given for merchandise.	56,984.70
Note secured by collateral.	149,000.00
	205,984.70
Bond and mortgage account for bonds of Pottsville Iron & Steel Company.	300,000.00

The assets amount to \$1,197,730.36, and liabilities to \$645,802.84. From the assets as given above \$45,972.66 will be set off for doubtful accounts.

A circular and a plan to provide for the payment of accruing interest has been issued by the Colorado Fuel & Iron Company of Pueblo, Col. The president finds that the sum of \$360,000 must be provided

to pay floating debt. The total liabilities, including first mortgage fives and collateral mortgage sixes, are \$1,619,000, against which the company have securities, bills receivable and cash of \$1,495,895, leaving a deficit of only \$123,105. The stockholders have practically the entire real estate free and clear, worth not less than \$2,000,000. The stockholders should be invited to buy \$500,000 of the Suburban Land & Investment Company's bonds now in the company's treasury, and to those who buy should be given *pro rata* on surrendering \$500,000 of common stock, \$500,000 of 5 per cent non-cumulative preferred stock. The idea of issuing the preferred stock is that subscribers to the bonds shall receive a bonus for so doing. The total liabilities of the company under this new scheme would be \$1,633,000.

The Elmira Rolling Mills, at Elmira, N. Y., announce a general reduction in wages of 15 per cent., to take effect November 5. It is stated that this is the first reduction made since the works were started in 1891, by N. D. Doxey & Co.

It is stated that the Hyde Park Iron & Steel Company of Leechburg, Pa., have been organized with a paid-up capital of \$75,000, and will erect works to consist of three sheet mills and a bar mill.

The 12-inch mill of the Pennsylvania Bolt & Nut Works, Lebanon, Pa., is being enlarged and remodeled.

The Diamond Steel Company of Reading, Pa., with an authorized capital stock of \$50,000, who about one year ago purchased the modest plant of Walter Steel and others, have more than doubled its capacity. They have thoroughly equipped it for the production of all kinds of merchant steel, with cutlery, die and tool steel a specialty. A largely attended meeting of their stockholders was held last week, at which the treasurer, S. Y. Reigner, submitted a statement of the earnings of the company. The stockholders resolved to increase the capital stock, some of the original stockholders at once agreeing to increase their investment. The process of their manufacture is peculiarly that of Walter Steel, who has been working in steel mills for about 30 years in both England and this country, and who personally superintends the whole operation. The use of his process is without royalty to the company. The increase of the capital stock is \$25,000, making the total \$75,000.

Poughkeepsie Furnace, at Poughkeepsie, N. Y., practically a new modern stack, was lighted on October 30.

All departments of the Reading Rolling Mill, Reading, Pa., are now in operation with the exception of the puddle mill.

The tin plate works of the United States Iron & Tin Plate Mfg. Company, at Demarest, Pa., will, it is stated, resume operation at once, after an idleness of some weeks. It is announced that a sharp reduction will be made in wages, amounting to 25 per cent. in the case of the heaters and 30 per cent. in the rollers' wages.

No. 2 of the Henry Clay furnaces of Eckert & Bro., at Reading, Pa., has been blown in after 16 months' idleness.

The Homestead, Pa., News is authority for the statement that the attempt to turn out street car rails in the 35-inch mill of the Homestead Steel Works, Homestead, Pa., has not been as successful as anticipated.

The Mahoning Valley Iron Company, Youngstown, Ohio, have recently made material additions to their equipment. This firm are filling some large orders for the Daniels Steel Railroad Tie Company, and have a number of others yet unfilled. It was for the purpose of being more fully equipped for turning out the class of work desired by this firm that the additions to machinery have been made.

General Manager James Gayley, Assistant General Manager Thomas James and Superintendent Geo. F. Harris of the Edgar Thomson Steel Works, Bessemer, Pa., have returned from a visit to the East, where a week was spent inspecting some of the most prominent iron and steel plants. It is said that some important improvements and additions to the Edgar Thomson Steel Works are contemplated.

The statement of the business of the Philadelphia & Reading Coal and Iron Company for September shows gross receipts of \$1,793,033.85. The gross expenses were \$1,805,555.88, made up as follows: Operating expenses, \$1,744,987.88; colliery improvements, \$48,537.61; expenditures for permanent improvements, &c., \$12,030.39; thus showing a loss from mining of \$12,

522.03. To this is to be added \$122,209.20 for one-twelfth current year's fixed charges, and thus leaving a total deficit for the month of \$134,731.32. For the month of September, 1893, there was a surplus of \$100,572.28. The total deficit for the fiscal year to date is \$1,086,390.52. For the corresponding period of 1893, the deficit was \$629,360.11.

An error was committed in a recent issue in the statement that Fowler & Sons' Anderson Bolt Works, at Anderson, Ind., had started up after an idleness of two years. The information came from an apparently creditable source, but the fact is that these works have not been shut down, except temporarily for repairs, at any time within two years. The works are running quite satisfactorily, or would be if prices were better. The proprietors have no expectation of building a rolling mill in connection with the plant, notwithstanding the persistency with which the report is kept in circulation.

The rolling mills at Cambridge, Ohio, have been shut down for the past week owing to scarcity of water, and the Baltimore & Ohio Railroad Company are hauling water in tank cars from the Muskingum River, at Zanesville, to water tanks between that point and Wheeling.

Machinery.

The plant of the Hubbard Foundry & Machine Company, Hubbard, Ohio, was destroyed by fire last week, the loss being about \$12,000, with \$6000 insurance. The statement is made that the plant will be rebuilt on a larger scale, and in the meantime the concern will arrange to place as many of their orders as possible with other concerns until the new plant is completed.

B. M. Nead and J. F. Raymond, receivers of the Raymond & Campbell Mfg. Company, Middletown, Pa., announce in a printed circular to the trade that they will continue the business of the company in all its branches. The company manufacture heating and cooking stoves, steam and hot water boilers, and do a general machine shop and foundry business. It is believed that the company will again be on a solid footing within a few months.

The A. Garrison Foundry Company of Pittsburgh shipped last week the balance of the equipment for the new sheet mills of the Pittsburgh Tin Plate Works, at New Kensington, Pa. This new plant is most complete in design, and will be put in operation at an early date.

The Leechburg Foundry & Machine Company of Pittsburgh have received an order for a Mesta patent pickling machine from the Monongahela Tin Plate Company of that city.

Wm. B. Pollock, boiler manufacturer, Youngstown, Ohio, and Wm. Tod & Co., engine builders, at the same place, have cojointly established an Eastern office in room 1103 Havemeyer Building, New York City.

C. & G. Cooper & Co., Mount Vernon, Ohio, have made additions and improvements to their foundry department in order to meet the demands for their Corliss engines. A No. 6 Whiting patent cupola of the latest type has been erected.

H. K. Porter & Co., Pittsburgh, Pa., builders of light locomotives, have recently put in a new 58-inch Colliau cupola furnace made by Byram & Co., Detroit, Mich.

The C. T. Segar Mfg. Company of Chicago have added a foundry to their plant. A No. 1 Whiting cupola has been erected. This, together with the ladles, &c., for the new shop, was supplied by the Whiting Foundry Equipment Company, Chicago.

The Kennedy Valve Mfg. Company of 52 Cliff street, New York, will, after November 1, occupy their new quarters at 75 John street, and will there keep a stock of all sizes of their gate, globe, angle, radiator, swinging check and indicator valves, indicator posts, hydrants, &c. They will then be in position to ship all orders, even in the larger sizes of gate valves, immediately upon receipt.

The Spicer Mfg. Company of New Philadelphia, Ohio, have placed on the market a new nail cleaning tumbling barrel. The shell is 36 inches in diameter, 53 inches long and made of 3-16 inch steel. It is riveted to cast iron heads, which are securely keyed to a 4-inch shaft extending entirely through the barrel and supported by cast iron pedestals. The pulleys are 36 inches in diameter by 9 inches face. Six-inch interchangeable brass bearings are used, which are fitted to the pedestals and held in place by

3/4-inch cap screws. The lid extends the full length of the barrel, is 12 inches wide and is composed of two sheets of steel, the inner sheet being so arranged as to allow the sawdust to escape. The machine occupies a floor space 4 1/4 x 7 1/2 feet and has a capacity of 25 kegs.

The Eddy Valve Company of Waterford, N. Y., have broken ground for a one-story brick structure, 100 x 40 feet, to be used for the storage of patterns.

The iron foundry of Hodge & Ladaman, at North Adams, Mass., has been so badly damaged by fire that it will have to be rebuilt. The loss was \$2500, and the insurance \$3750.

The Otto Gas Engine Company have contracted for two one-story factories at Thirty-third and Walnut streets, Philadelphia. One building is to be 50 x 167 feet, and the other 38 x 114 feet. Alterations are also to be made in the erecting shop.

At Hubbard, Ohio, the plant of the Hubbard Foundry & Machine Company has been burned, at a loss of \$15,000.

An effort is being made to increase the capital stock of the Wright Machine Company, Worcester, Mass., with a view to enlarging the plant. The company manufacture governors.

The Ludlow Mfg. Company have broken ground at Springfield, Mass., for a new machine shop, to be 100 x 60 feet in size.

The Phoenix Mfg. Company, Eau Claire, Wis., are building an addition, 160 x 46 feet, to their machine shop.

The Ramapo Iron Works, Hillburn, N. Y., have installed a new Westinghouse engine in their foundry and are building an addition to their car shop for the storage of castings.

The Ivens Mfg. Company of New Orleans, La., and the Hudnot Iron Company of Big Rapids, Mich., have consolidated under the name of the Interstate Iron Works Company. They will erect a new plant at Meridian, Miss., and engage in the manufacture of irrigating machinery, dredges, sugar machinery, cotton presses, &c.

The Henry McShane Mfg. Company of Baltimore, Md., have secured 70 acres of land just beyond the eastern city limits, about 2 miles from the Maryland Steel Company's Works, at Sparrow's Point, and will erect a new plant. The buildings contemplated include a pipe foundry, a pattern shop, a brass foundry, bell foundry, finishing shop and power house. The company's product includes iron pipe, brass fittings for plumbers' and other uses, and bells. Construction work will begin early in 1895. About \$1,000,000 will be expended.

The Geo. V. Cresson Company, Philadelphia, among other contracts are furnishing the power transmitting machinery for the cotton mill of Sucesores da Eusebio Gonzalez, Salvatierra, Mexico; also for the factory building of John G. Carruth & Co., Rosehill street and Indiana avenue, Philadelphia, and the Howard & Bullough American Machine Company, Limited, Pawtucket, R. I.

The Cramp Metal Mfg. Company is the name of a new concern, incorporated under the laws of Pennsylvania, and starting in business at Olney, Philadelphia. They have just completed the erection of a new smelting house, and have installed in a suitable building a plant for rolling sheet copper, consisting of 12 mills. They are entering the market with sheet copper in various forms, and with their facilities for business will no doubt secure a share of the trade in their line. The officers of the company are W. I. Cooper, president; B. H. Cramp, general manager; Richard Peters, Jr., secretary, and D. J. Matlack, treasurer.

Hardware.

Moore Mfg. & Foundry Company are now operating the foundry portion of their new plant at South Milwaukee. The machine shop has not yet been entirely moved, but the company are working at it and expect soon to have the full plant in blast. Their office will continue to be in Milwaukee, but at 157 Michigan street instead of the old location. All correspondence should be addressed to the company at the Milwaukee office.

Nut & Washer Mfg. Company, Milwaukee, Wis., advise us that their new works are now in running order. They state that their factory is well equipped for the production of plate washers, felloe plates and a variety of other stamped articles entering into the manufacture of agricultural imple-

ments, wagons, &c. The company have facilities for turning out from 8 to 10 tons of finished product per day, and are well situated for the prompt shipment of orders. They have a number of orders in hand, most of them from leading implement makers.

The Anthony Wayne Mfg. Company, Fort Wayne, Ind., have secured a ten-year lease on a lot in St. Louis, Mo., 150 x 240 feet, and are overhauling their plant preparatory to removing to that city.

Grand Rapids Cycle Company, Grand Rapids, Mich., expect to turn out about 4000 wheels for the coming season, which will double their output of last year. They have nearly completed the new addition to their factory, which is three stories in height, built of white brick. The addition will have more floor space than the old factory. The new building will be used for those departments of the business which require no power, such as the assembling, japping and stock rooms. The first floor front will be occupied as an office.

Henry Williamson of Bay City, Mich., is offering for sale United States and Canadian patents on a saw swage of his invention. This tool is intended more especially for light gang and band saw use. It swages on back of tooth and leaves, it is claimed, a good face on bottom of tooth.

The Spaulding Machine Screw Company, Kensington, N. Y., have found it necessary to enlarge their plant to about twice its present size. The new factory will be 100 x 120 feet.

Work has been commenced on a new one-story file factory, 22 x 50 feet, on the west side of State road, north of Union street, Philadelphia. Charles J. Hand, 7138 State road, is the owner of the plant.

The force of employees at the Norwich Lock Mfg. Company's plant has recently been increased and now numbers 160, all making full time.

The new warehouse of the Pennsylvania Bolt & Nut Company, Lebanon, Pa., is nearly completed.

The Standard Automatic Releasing Hook Company of New York City, have been incorporated, with a capital of \$30,000. The directors are W. H. Langley, H. Jubert, J. Ellsworth, W. H. Vresland and J. R. Raymond.

The entire plant of the Plymouth Air Gun Company, Plymouth, Mich., was destroyed on the 14th inst. Loss about \$9000.

The Plymouth Cycle Mfg. Company, Plymouth, Ind., have been incorporated, with a capital stock of \$100,000. The directors of the new company are Millard W. Simons, F. Celestia Simons, Martin D. Smalley, F. W. Laukeman and Samuel Parker.

The Howard Fiberware Company of Portland, Maine, have been incorporated by John A. Shelby, Henry R. Baker, R. Hilton Chase, E. H. Wilson, W. A. Chapman, D. Wilcox and Russell Brown of Providence, R. I.; F. B. Howard of Montreal, P. Q., and Henry A. Stearns of Pawtucket, R. I.

The Kansas City Plow Company of Kansas City, Mo., have been incorporated, with a capital stock of \$50,000.

The Munger Bicycle Company, Indianapolis, Ind., are erecting an addition to their factory, and will shortly increase their working force.

The Williamsport Bicycle & Mfg. Company, Williamsport, Pa., are erecting a factory at Weatherly, near Wilkes-Barre, which will have a capacity of 5000 wheels per annum. The Williamsport business will be conducted as heretofore in charge of William H. Coldwell, and a full line of bicycle supplies may be obtained from that point.

The Mystic Cycle Works of Mukwonago, Wis., have filed articles of incorporation. The capital of the company is \$6000, and the incorporators are A. Harden, Perry P. Camp, Clinton Palmer and others.

The Wire Goods Company, Worcester, Mass., are prepared to manufacture bicycle spokes and nipples threaded to match, and call the attention of bicycle manufacturers to the fact that spokes threaded at one place and nipples threaded in another often lead to unfortunate results. The company state that their specialty is the making of screw threads, and recommend the trade to allow them to make both the spoke and the nipple and thus insure a perfect match in every feature of the thread on each.

The Iron and Metal Trades.

The week has been uneventful, relatively speaking, and has not in any pronounced way furnished indications to gauge the drift for the future. On the whole, there is a more hopeful feeling, due possibly rather to the absence of bad news than to the occurrence of favorable events.

Certainly the most interesting announcement of the week is that C. P. Huntingdon has bought for Pacific Coast delivery a block of 6000 tons of Cammell (English) Steel Rails at a low price. This verifies the assertions repeatedly made by American makers that they are in danger of losing the Pacific Coast market.

A conference of some of the American Steel Rail makers took place, as expected, in this city last Friday. We understand that the situation was informally discussed, but that no action was taken. The Iron trade in general takes unusual interest in developments in this branch this year, since it is widely believed that there is an opportunity, under certain circumstances, to stimulate the demand very greatly. Many hold that if only a part of the heavy requirements for renewals are placed for next year a powerful help toward a general recovery of values will be given.

The little flurry in Bessemer Pig Iron in the West as the result of the appearance of a large new buyer, illustrates quite well what an impression an addition of say 500,000 tons in one year to the Rail tonnage would make.

As it is, the producers of Bessemer Pig Iron who are running on cheap ore and 90¢ coke are about the only ones in the Iron trade who have the reputation of making a fair amount of money.

In Billets there has been a moderate demand, with prices hovering close to \$15.50 at Western works. Sales below that figure were recorded. Wire Rods are weak, and are obtainable at \$25.25, Western mill.

The pounding of prices goes on along nearly the whole line of Manufactured Iron and Steel. While it is true that many decline to meet present prices, it cannot be denied either that there is a sufficient number of hungry mills who are willing to meet the market. Pittsburgh came out victorious for a 3500-ton order for Beams for the Guggenheim Building, New York.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Pa., October 30, 1894.

The demand for Iron and Steel has been somewhat heavier during the past week, but for all practical purposes the market is unchanged. Prices are low, but at the present decline manufacturers have drawn a line, and if they cannot do business without making further concessions, they seem disposed to let it go elsewhere. There is not much demand, it is true, but quotations are asked for and bids are made. In actual transactions prices have been equal to those ruling a week ago, bids at less money being promptly turned down. It is notable, however, that on orders placed very recently deliveries are called for with considerable urgency, showing that consumers are short of stock, and that without additional orders for the next week or two mills and furnaces will have all the business they can handle. The elections are figured upon as likely to give some definite character to the market, but until that question is decided it is not likely that either side will go into any very extended operations.

Pig Iron.—Good Mill Irons are scarce and in demand. Large sales have been made recently and furnaces are urged to make deliveries as rapidly as possible, from which it is clear that somebody is consuming large quantities of that class of Iron. Foundry grades are also in good demand, but there is plenty to go around at current quotations, which is in fact true of every description of Iron. Prospects as regards the future are expected to be influenced considerably by the result of next week's elections, but in any event, there is no reason to expect any material change in prices. The demand will probably be influenced by the elections, but the low price of Ores and immense capacity for production will for the present prevent any marked advance in prices. Meanwhile sales are on a fairly liberal scale at about the following quotations for Philadelphia, and 20¢ @ 30¢ less for deliveries to the west or southwest of that point:

Bessemer.....	\$12.75 @ \$13.00
Standard No. 1 Foundry X.....	12.50 @ 12.75
Standard No. 2 Foundry X.....	11.50 @ 11.75
No. 2 Plain.....	10.75 @ 11.00
No. 1 Soft.....	11.50 @ 11.75
No. 2 Soft.....	10.75 @ 11.00
Standard Gray Forge.....	10.50 @ 10.75
Ordinary.....	10.00 @ 10.25

Steel Billets.—Prices seem to have settled down to about \$18 for Philadelphia deliveries. In some instances large lots have been done at less money, but anything below \$18 is considered rather exceptional. The demand has been pretty well supplied, however, and for awhile it is likely that new business will be scarce, as consumption is not large and of late has run on Iron to a greater extent than for a long time past. Negotiations are in progress, however, but if sales result to any extent it will be because special inducements are made, rather than to any necessity on the part of the buyer.

Finished Material.—There is no material change from the conditions recently ruling. Mills are doing somewhat better than they were two or three weeks ago, and prospects are said to be a little better, but the fact that prices remain at the very lowest shows that there is no decided improvement. The more general distribution of business is thought to be a good feature, however, everything being wanted in a small way—Bars, Plates, Shapes, Sheets,

Skelp—all contribute something toward the average, and while the orders are small individually the aggregate is of fair proportions. A good deal of estimating is going on, and if it results in business mills will be kept busy for some time to come, but it requires a good deal of estimating and very low bidding to secure even small orders in times like these. General quotations, delivered, are about as follows, but on special lots prices are made according to size and character of order:

Grooved Skelp.....	1.22 1/2¢ @ 1.25¢
Standard Refined Bars.....	1.20¢ @ 1.25¢
Medium quality.....	1.10¢ @ 1.15¢
Tank Steel.....	1.30¢ @ 1.35¢
Heavy Plates.....	1.30¢ @ 1.40¢
Shell.....	1.50¢ @ 1.60¢
Flange.....	1.60¢ @ 1.80¢
Angles.....	1.40¢ @ 1.50¢
Beams and Channels.....	1.50¢ @ 1.60¢

Old Material.—The demand is fair and sellers have less difficulty in securing quoted rates on good lots, but inferior stock can be had at very low figures. General asking prices, delivered, are about as follows:

Heavy Melting Steel.....	\$10.00 @ \$11.00
Light Melting Steel.....	8.00 @ 8.50
No. 1 Wrought Scrap.....	10.00 @ 11.00
Machinery Cast.....	9.00 @ 10.00
Wrought Turnings.....	8.00 @ 8.50
Cast Borings.....	6.00 @ 6.50
Old Iron Rails.....	11.50 @ 12.00
Old Car Wheels.....	9.75 @ 10.25

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, October 31, 1894.

The situation shows very little improvement as compared with last week. A great deal of interest is now taken in the political outlook, and to some extent this is distracting the attention of business men. It almost assumes the dignity of a Presidential campaign. The belief is freely expressed that an improvement can be expected after the results of the election are known.

Pig Iron.—Manufacturers of local Coke report considerable inquiry but light business. The contracts for the past week have seldom gone beyond 100-ton lots. These are fairly numerous and the outlook is reported as still encouraging for future business. Those consumers who are buying conservatively are forced to come into the market frequently. They report that they find their stocks depleting much more rapidly than anticipated. The reported decision of Southern furnace companies to compete more vigorously for orders in this market is possibly influencing consumers to buy more cautiously than they otherwise would with such a good demand for their output as at present. Any check in purchasing now will have to be made up later and will only result in a much greater volume of business. Shipments are exceedingly heavy on old contracts. Sales of Southern Coke have been much less than of Northern, although one company report a few good sized contracts. Lake Superior Charcoal is weak; about 500 tons have been sold here at a price reported to be close to \$12.50. Quotations are given as follows for cash:

Lake Superior Charcoal.....	\$13.00 @ \$15.00
Local Coke Foundry, No. 1.....	10.25 @ 11.00
Local Coke Foundry, No. 2.....	10.00 @ 10.25
Local Coke Foundry, No. 3.....	9.50 @ 10.00
Local Scotch.....	10.25 @ 11.00
Ohio Strong Softeners No. 1.....	13.00 @ 13.50
Southern Silvery, No. 1..... @
Southern Silvery, No. 2.....	10.50 @
Southern Coke, No. 2.....	10.50 @ 10.75
Southern Coke, No. 3.....	10.00 @ 10.25
Southern, No. 1, Soft.....	10.50 @ 10.75

Southern, No. 2, Soft.....	10.25 @	10.50
Alabama Car Wheel.....	17.50 @	18.00
Jackson County Silvery.....	15.50 @	16.00
Other Ohio Silvery.....	14.25 @	14.50
Coke Bessemer.....	11.25 @	11.50
Coke Malleable.....	10.50 @	11.25
Spiegeleisen 20%.....	... @	26.00

Bars.—A little improvement is perceptible in inquiry, but hardly sufficient to relieve the appearance of stagnation which has latterly characterized this branch of business. Manufacturers are endeavoring to get a slight increase in prices, and quotations on mill shipments are now 1.02½ @ 1.05¢, Chicago, but desirable specifications could be placed lower. Guaranteed Iron continues to be quoted at 1.15¢ @ 1.20¢ and Soft Steel Bars from strictly Billet stock at 1.20¢ @ 1.25¢. Jobbers have lately experienced a slightly better demand from stock, but small lots are still selling at 1.15¢ upward for Iron and 1.25¢ upward for Soft Steel.

NOTE.—It is stated on good authority that the recent contract for 500 tons of Car Iron was not placed at 0.95¢, but that special conditions governed the transaction which made the actual price realized nearer 1.10¢.

Structural Material.—Bridge orders are still excellent. A local bridge works took one contract the past week amounting to about 350 tons and several smaller orders were distributed among other establishments. Some good sized bridges are to be placed this week aggregating in all about 500 tons. A fair number of small orders are coming in for building shapes. The demand keeps up remarkably well from country towns in lots of two or three Beams each. Large contracts are rare at present, but a warehouse is now contemplated which will require several hundred tons of Iron and Steel. Quotations for mill shipments, Chicago delivery, are as follows: Beams and Channels, 1.50¢; Angles, 1.40¢ @ 1.45¢; Tees, 1.65¢; Universal Plates, 1.40¢ @ 1.45¢. Small lots of Beams and Channels from stock, 1.75¢ @ 1.90¢; Angles, 1.50¢ @ 1.60¢; Tees, 1.70¢ @ 1.80¢.

Plates.—Manufacturers' agents report good orders for Boiler and Tank work, which have given this branch of trade the appearance of comparative activity. Jobbers have also had an excellent demand for small lots from stock. We continue prices on mill shipments, Chicago delivery, as follows: Tank Steel, 1.40¢ @ 1.50¢; Flange Steel, 1.65¢ @ 2.10¢; Fire Box, 1.65¢ @ 5¢. Store prices are as follows: Iron or Steel Sheets, Nos. 10 to 14, 1.70¢ @ 1.80¢; Tank Steel, 1.50¢ @ 1.65¢; Flange Steel, 2¢ @ 2.15¢; Boiler Tubes, in carloads, 75% off.

Sheets.—The inquiry for Black Sheets keeps up, but prices are inclined to droop. Manufacturers are looking forward to the future now and are looking for business to keep their works well employed during the winter. Agricultural Implement makers are expected to place some large contracts during the coming month. Mill shipments of No. 27 Common Iron for early delivery are quoted at 2.35¢ @ 2.40¢, Chicago; Steel Sheets, 2.45¢ @ 2.50¢. Galvanized Sheets are quiet and prices are weaker, owing to efforts made by some mills which are evidently in need of work. Standard brands are quite firmly held at 75 and 10 and 5% @ 75 and 15%. Sheet Copper is unchanged at 14¢ base. Small lots of No. 27 Common Black Sheets from stock are selling at 2.40¢ @ 2.50¢, and Galvanized Iron, 75 and 10% off.

Merchant Steel.—A fair business is reported by sellers of agricultural and

vehicle shapes. New orders are coming in quite encouragingly and specifications on contracts are being received in good quantity. Tool Steel is in very light demand and is being peddled out of warehouses in unusually small lots. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery Steel, 1.50¢ @ 1.60¢; Smooth Finished Tire, 1.50¢ @ 1.60¢; Open Hearth Spring Steel, 1.75¢ @ 1.80¢; Bessemer Machinery, 1.40¢ @ 1.45¢; Bessemer Tire, 1.40¢ @ 1.45¢; Ordinary Tool Steel, 5½¢ @ 7¢; Specials, 10½¢ and upward.

Billets and Rods.—Nothing new has occurred in the Billet situation, the local mill being still well employed and making no open quotations. A strong demand is noted for Wire Rods, but the local makers also seem to be crowded with work and no transactions are reported.

Rails and Track Supplies.—Business in Steel Rails is still confined to small lots, and thus far no large orders are in sight in this locality. Quotations are continued as follows: Standard Rails, \$25 @ \$27; Steel Splice Bars, 1.25¢ @ 1.35¢; Track Bolts, with Hexagon Nuts, 2¢ @ 2.10¢; Spikes, 1.65¢ @ 1.75¢; Links and Pins, 1.65¢ @ 1.70¢.

Old Rails and Car Wheels.—A sale of Old Iron Rails is reported at \$11.50, East St. Louis. Consumers in this vicinity have not taken any recently, and say that they would not offer over \$10.50, which is somewhat below the views of railroads. Old Steel Rails are weaker with larger offerings, and quotations now range from \$7.25 for short pieces to \$10 for long lengths. Old Car Wheels are quiet with quotations nominally \$9.75 @ \$10.

Scrap.—Cast Scrap has been selling quite freely, one order of 300 tons having been taken at a good price. Forge Scrap is in fair demand again, while cheap grades are in very limited supply and in good request. Dealers quote the following selling prices per net ton: Railroad Forge, \$9; Dealers' Forge, \$8.50; No. 1 Mill, \$7; Pipes and Flues, \$7; Axles, \$13; Heavy Cast, \$7.50 @ \$7.75; Stove Plates, \$5.50 @ \$6; Cast Borings, \$3.50; Wrought Turnings, \$5.50; Axle Turnings, \$6.25; Fish Plates, \$9.50 @ \$10; Horseshoes, \$9.25; Mixed Steel, gross ton, \$6; Heavy Melting Steel Scrap, \$7 @ \$7.50.

Metals.—Lake Copper is still held at 10¢ in carload lots. Casting Copper is unchanged at 9½¢ @ 9½¢ according to brand and quantity. Spelter is weak and can now be had at 3.22½¢ @ 3.25¢. Pig lead has recently been somewhat more active, at 2.95¢ for spot.

Louisville.

LOUISVILLE, KY., October 29, 1894.

The market is somewhat weak, caused by lack of orders, and in consequence the furnaces will probably accumulate more stock this month than for several months past. This need not cause uneasiness, as a large general business is looked for next spring, which will consume all available stock. Very little other than Southern Irons are used here, and the following are the revised quotations:

Southern Coke, No. 1 Foundry.	\$9.75 @	\$10.25
Southern Coke, No. 2 Foundry.	9.25 @	9.75
Southern Coke, No. 3 Foundry.	8.75 @	9.25
Southern Coke, Gray Forge....	8.25 @	8.50
Mottled Coke	8.0 @	8.25

There is considerable demand for Beams and Shapes, and Bar and Sheet

Irons are selling freely, the extremely low prices stimulating consumption. Very few inquiries are received for Rails, except relays, and these are wanted for repairs and for lumber interests.

Birmingham.

BIRMINGHAM, ALA., October 29, 1894.

It is a somewhat difficult task to write up the market conditions for this week correctly. The flurry of last week has given place to a calmer feeling, and there is more indifference manifested among manufacturers. The general feeling is that a better trade can be looked for early in November. Prices have settled to a somewhat lower basis, and are reported firm at that. Inquiries are not as numerous as heretofore, though orders already booked will keep all production moving, and makers look without apprehension on the slight falling off of orders, especially as these orders are still very close to current production. Demand for prompt shipment continues to be urgent, and no difficulty to meet it is reported. The reported firmness of Pittsburgh will undoubtedly be felt here in due time, and check any further downward tendencies in Finished Materials. Considerable surprise has been manifested at the large increase reported in stocks of Pig Iron in Alabama and Georgia by the monthly report of the Western Iron Association for September, as the reports and yards of this district indicated but little accumulation. One feature which would cause an apparent accumulation is that there has been a large increase in production, and for every furnace blown in there is always a certain accumulation to supply shipments or awaiting shipments. In this way the visible stocks on hand may show an accumulation, yet not constitute what is generally understood as an increase in stocks. Here, however, this natural accumulation has not shown more than 5000 or 6000 tons all told in September, though in the last few weeks it has been more apparent at some furnaces.

Pig Iron.—Sales are reported light to fair, not fully up to production, but demand for prompt shipment continues at most furnaces. Few large orders are reported; one sale of 1000 tons No. 2 Foundry is reported, to Chicago, as well as several smaller sales at current prices. There is some shading on the higher grades, though \$7 for No. 2 Foundry is the lowest figure shown. Orders are mainly for small lots, and for all grades, but the lower grades are more urgent for prompt shipments. There is no tendency to sell ahead, though a few inquiries begin to come in on this point. The demand for Nos. 1 and 2 Foundry is improving, urged on possibly by the low figures at which these grades are sold. Stocks are accumulating slowly and evenly distributed as to grades, though not as to location. No. 2 Soft is still somewhat short, and demand for it active. An interesting feature as regards freights is the chartering of the schooner "Chas. K. Schnell" to go to Pensacola for a cargo of 1200 tons No. 3 Foundry and Gray Forge for Philadelphia from Birmingham, at a marked reduction in freight. This is but a beginning and will be followed by other shipments at an early date. In spite of local reports there will be no increase in output at an early date.

Manufactured Material.—There is little change reported. The market is

a little heavy, with no immediate promise of better prices until Pittsburgh settles down to a firmer basis. Demand is good and well up to make. It is general though still good for Light Sheets. While there is a gradual increase in output, no further resumptions of local mills are probable at an early date.

Rails and Railroad Material.—The movement in Lumber is beginning to stimulate movements in this class of material and inquiries are active and some fair sales reported.

Pittsburgh.

Office of *The Iron Age*, Hamilton Building, Pittsburgh, October 30, 1894.

Here and there evidences are visible that the situation is showing improvement as far as volume of business is concerned. A large plant in this vicinity whose manufactures are used exclusively by railroads started up on full time this week after running four days a week for more than a year and a half. Some of the foundries report trade as considerably better, and if one-half of the Tin Plate projects now under negotiation are carried through it ought to make considerable work. Whether or no the result of the elections next week will have any influence on the situation in the Iron and Steel trades the fact remains that buyers are waiting until it is over and are holding off placing their orders. Should the result be as is largely anticipated many believe that it will have a very beneficial influence on business. The week under review was extremely quiet and nothing of interest developed. The movement in Pig Iron is very light and prices are perhaps a shade weaker. In Billets the situation is hardly satisfactory from the makers' standpoint of view. The mills are fairly busy, but prices are not as firm as could be desired. In Structural Material the demand is falling off to some extent, while Plates show a slightly better demand and several makers have advanced prices. The Bar Iron trade is very dull, and some record breaking prices have been made. The Wire and Wire Nail trades are in very unsatisfactory condition, the demand being extremely light and prices lower than ever before. Very little is doing in Coke, and for balance of the year 90¢ per ton on Furnace Coke can be done readily.

Pig Iron.—Sales during the week have been extremely light, although considerable Iron is in negotiation, but it is not expected that any material amount of business will be done until after the elections. While the output of Bessemer Iron is just as large as it was a month ago, and perhaps a trifle heavier, it is nevertheless true that stocks are exceedingly light, which goes to show that consumption is keeping up with production, or very close to it. In the Pittsburgh district out of some 25 or 26 furnaces, the product of only four or five is offered for sale in the open market. On the other hand, some of the largest consumers of Pig Iron are in the Pittsburgh district, and besides consuming their own output are regular buyers from outside furnaces. In the Valley districts everything is running that can be put in operation, and the fact that the Ohio Steel Company have commenced negotiations for the purchase of Bessemer Iron for delivery after the first of the year has imparted a slightly stronger feeling in that section. As far as can be learned, no Iron has as yet been bought by this concern,

but negotiations involving a considerable quantity are pending. The demand for Forge Iron is not heavy, but the supply is limited, and prices are about as noted for the last week or two. The same remarks apply to Foundry Iron, which has showed little or no change in price for some time. We quote as follows:

Neutral Gray Forge.....	\$9.75 @	\$9.90 Cash.
All-Ore Mill.....	9.75 @	10.00 "
No. 1 Foundry.....	11.65 @	11.75 "
No. 2 Foundry.....	10.75 @	11.00 "
Bessemer.....	10.85 @	11.00 "

We note a sale of 500 tons of Bessemer for November delivery at \$10.85, delivered at buyer's mill. Also a sale of 1000 tons of Gray Forge at \$9.75, Pittsburgh. Also a sale of 200 tons of off grade Bessemer at \$10, Pittsburgh.

Ferromanganese.—We note a sale of some 30 tons of foreign Ferromanganese at a shade under \$50, delivered at buyer's mill, in the Pittsburgh district. The quality of this foreign article is reported as very satisfactory, the analysis showing 82% of Manganese.

Billets.—There have been some sales of Billets to Eastern mills and additional lots are under negotiation. As yet, however, buyers are largely confining themselves to purchases for close requirements, and it would doubtless require an exceedingly low price to be named before future requirements would be anticipated. Mills in the Pittsburgh district are pretty well fixed with business, and are refusing to sell at less than \$15.75 at mill. Slightly lower prices are being named by outside districts, several Pittsburgh buyers having been offered Billets as low as \$15.35 at mill. We note a sale of 1000 tons of Billets for November delivery at a price equal to \$15.75 at maker's mill, Pittsburgh, also a sale of 3000 tons of Billets for November and December delivery at \$15.40 at maker's mill.

Plates.—The situation is somewhat improved. Advices are that railroads are commencing to come into the market, a fairly large order for this class of work having been secured by a Pittsburgh mill last week, and the outlook for additional sales to this class of consumers is very encouraging. Prices are a trifle firmer, and we have revised quotations accordingly and now quote as follows: Tank Steel, 1.25¢ @ 1.30¢; Flange, 1.35¢ @ 1.40¢; Shell, 1.30¢ @ 1.35¢. For a very desirable order our lower quotation on Tank Steel might be shaded about \$1 per ton.

Structural Material.—The demand for Beams and Channels has fallen off to some extent, doubtless due to the approach of cold weather. The two local mills, however, continue extremely busy and considerable bridge work is reported as being placed. Prices show no material change, and we repeat former quotations, as follows: Beams and Channels up to 15-inch at 1.25¢ @ 1.35¢, according to order; Angles and Universal Plates, 1.15¢ @ 1.20¢, according to order, and Tees at 1.35¢.

Muck Bars.—The demand is very light, and the only sale reported in this market for several days was one of 200 tons of standard quality at \$18.75, delivered at buyer's mill.

Bars.—The demand does not show any improvement, and some record breaking prices have recently been made in this market. One concern in particular is being referred to as extremely aggressive in their campaign for business. A sale of Steel Bars at 1¢, delivered, with an 8¢ freight rate, is re-

ported as having been recently made by a local concern. We quote Steel Bars at 1¢ @ 1.05¢, but our lower quotation is shaded for desirable orders. Some of the Valley mills are fairly full of work, while others have very little on their books. We quote Common Iron Bars at 0.95¢ @ 1¢ at mill, with usual extras.

Merchant Steel.—Nothing of special interest developed during the week and we repeat former quotations, as follows: Bessemer Machinery, 1.15¢ @ 1.25¢; Open Hearth Spring, 1.50¢ @ 1.60¢; Open Hearth Machinery, 1.40¢ @ 1.50¢; Machine Straightened Tire, 1.50¢ @ 1.60¢; Sleigh Shoe, 1.50¢ @ 1.60¢; Toe Calk, 1.70¢ @ 1.75¢.

Skelp Iron and Steel.—We note a sale of 300 tons of wide sizes of Grooved Steel Skelp at 1.02½¢ at buyer's mill. We quote as follows: Grooved Steel Skelp, 1¢ @ 1.10¢, according to size; Sheared Steel Skelp, 1.15¢ @ 1.20¢; Grooved Iron Skelp, 1.15¢ @ 1.20¢; Sheared Iron Skelp, 1.25¢ @ 1.30¢.

Sheets.—The demand is hardly as heavy as it has been, but most of the mills have enough work booked to keep them fully employed for the next two or three weeks. Prices are firm, but unchanged, and we continue to quote No. 27 Common Iron at 2.25¢ and No. 27 Steel 2.35¢. Galvanized Sheets continue in good demand, and are ruling at 75 and 10 and 5% @ 75 and 10% off, according to order.

Pipes and Tubes.—There has been no change in the situation over that noted last week. A moderate amount of business is being offered, but the large orders have mostly been placed. Prices are somewhat lower than were ruling a month or so ago, and depend altogether upon the nature of the order.

Wire Rods.—The Rod market is exceedingly quiet. Most of the buyers have their requirements covered, and while some mills are fairly well sold up others are eager for business. We quote Wire Rods at \$22.50 at maker's mill, but for a good sized order this price would probably be shaded.

Wire Nails.—The unsatisfactory condition of the Wire Nail trade referred to last week continues. There is a fair demand, but buyers are holding off to some extent in the expectation that prices may go lower. We quote Wire Nails at 95¢ at maker's mill, but on round lots this price would probably be shaded. The demand for Cut Nails is extremely light, and as before noted one or two of the mills in the Wheeling district are not in operation and are filling orders from stock. We quote Cut Nails at 85¢ @ 90¢ for usual averages.

Barb Wire.—The demand for Barb Wire is somewhat light at present, but inquiries for delivery next year are reported as coming in more freely. We quote Barb Wire at \$1.95 @ \$2 for Four-Point Galvanized at maker's mill. We quote Plain Wire at \$1.20 @ \$1.25 in carload lots at maker's mill.

Connellsville Coke.—Production of Coke in the Connellsville region has shown a falling off every week for the last month or so, and the week under review was no exception. For the week ending October 20 there were 14,323 ovens active and 3251 idle, the estimated production for the week in question being 139,010 tons. Compared with the production of the previous week, this was a decrease of 3889 tons. Very little Furnace Coke is changing hands, the blast furnaces having contracts run-

ning until the first of the year. Prices on Coke are weak, and Furnace Coke has been offered for balance of the year delivery on the basis of 90¢ a ton at oven. Foundry Coke is quoted at \$1.05 @ \$1.15 to consumers.

St. Louis.

(By Telegraph.)

Office of *The Iron Age*,
Bank of Commerce Building, {
St. Louis, October 31, 1894.

Pig Iron.—The demand has again resumed its normal condition and lots of from 100 to 200 tons is the average report from the furnace agents. These orders are being received with considerable regularity, however, so that a fair amount of business is being sent to the furnaces. One favorable feature of the let-up in the demand, is the fact that a number of furnaces who were making arrangements to blow in have ceased their preparations and will await a revival which has a tendency to be more permanent than the last spurt before they again begin operations. Prices continue to be shaded and No. 1 and No. 2 Foundry are quoted at \$10.75 and \$9.75 respectively, while Gray Forge is obtainable at from \$9 to \$9.25 f.o.b. cars St. Louis. We quote as follows for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry	\$10.75 @ \$11.00
Southern Coke, No. 2 Foundry	9.75 @ 10.00
Southern Coke, No. 3 Foundry	9.50 @ 9.75
Southern Car Wheel	16.50 @ 17.00
Gray Forge	9.00 @ 9.25
Ohio Softeners	14.00 @ 14.50

Bar Iron.—There is no improvement to note in this department either as regards price or demand. Mill shipments are quoted at 1¢ @ 1.05¢. Jobbers are fairly busy and quote 1.15¢ @ 1.20¢, according to quality.

Barb Wire.—A limited demand is reported for Barb Wire at unchanged prices. Painted from mill is quoted at \$1.70; Galvanized, \$2.10.

Wire Nails.—The season for large sales of Nails is practically over, so that the demand is limited. The low prices at present prevailing may induce heavy buying for the spring trade, but the indications at present do not point that way. Mills quote from \$1.05 to \$1.10 for carload lots.

Rails and Track Supplies.—In addition to the sale of 1000 tons of Rails noted in our last report, there has been 3000 tons added to it during the past week. These sales are encouraging and indicate that the long deferred railroad buying may be close at hand. Old Iron Rails are a trifle more active at \$11 @ \$11.25. Track Supplies are in good demand and are quoted as follows: Splice Bars, 1.30¢; Spikes, 1.60¢; Bolts, Square Nuts, 1.85¢; with Hexagon Nuts, 1.95¢; Steel Links and Pins, 1.50¢; Iron, 1.60¢; Steel Rails are quoted \$26.50 @ \$27.

Pig Lead.—This metal is firmly held at 2.95¢ and sales of several hundred tons are reported at this figure. The season is late, however, and no large buying is anticipated.

Spelter.—The demand for Spelter is largely of a hand-to-mouth character and what few sales are made are taken at 3.20¢. There seems to be some strength to the market, however, and any active buying would doubtless make itself felt in advancing the price.

Albert Waycott, St. Louis, Mo., for the past six years the sales agent in the

Southwest for the Springfield Iron Company, will in the future act in this capacity for several manufacturing concerns. He has already closed contracts with the Springfield Iron Company, Springfield, Ill., and Moore, Jones & Co., St. Louis. Mr. Waycott will go East at once to perfect arrangements with a number of Eastern concerns with whom he has been in correspondence.

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts., {
CINCINNATI, October 31, 1894.

There has been no large trade in Southern Pig Iron during the week, although there were more free offerings and the stronger Southern companies are offering to make concessions of 25¢ @ 40¢ \$ per ton to effect sales of any considerable quantity, but there is little demand in this immediate vicinity, although there have been some jobbing sales and several of 500 tons to go north and east of here. The production of Southern Iron appears to be much larger than anticipated, and although there are liberal shipments upon old contracts, there are offerings for prompt shipment of nearly all kinds. There has been an expectation that the demand would improve after the election next week, but there is now a disposition to extend the time indefinitely, and it is doubtful if it comes by the end of the year. The whole market is in easy condition, and if there was any disposition to buy other kinds of Iron the advantage would be with the buyers. Quotations are as follows:

Foundry.

Southern Coke, No. 1	\$10.00 @ \$10.25
Southern Coke, No. 2	9.10 @ 9.75
Southern Coke, No. 3	8.75 @ 9.00
Ohio Soft Stone Coal, No. 1	14.50 @ 15.0
Ohio Soft Stone Coal, No. 2	14.00 @ 14.50
Lake Superior Coke, No. 1	12.00 @ 12.50
Lake Superior Coke, No. 2	11.00 @ 11.50
Hanging Rock Charcoal, No. 1	16.00 @ 16.50
Hanging Rock Charcoal, No. 2	15.50 @ 16.00
Tennessee Charcoal, No. 1	13.00 @ 13.50
Tennessee Charcoal, No. 2	12.00 @ 12.50

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	15.75 @ 16.75
Lake Superior Car Wheel and Malleable	14.25 @ 14.75
Forge	

Gray Forge

Mottled Coke

New York.

Office of *The Iron Age*, 95-102 Reade street, {
NEW YORK, October 31, 1894.

Pig Iron.—Some agents report that the aggregate sales are taking care of more than current product, others confess that the business is exceedingly dull indeed. The market, so far as Southern Irons are concerned, is easy. In the Cast Pipe trade the demand has naturally fallen off, with the approach of the end of the season. Inquiries have come to hand, however, for spring deliveries and quotations representing an advance over present prices have been made. No business has yet been closed, however. We quote standard brands \$12.25 @ \$12.50 for No. 1; \$11 @ \$12 for No. 2; \$10.50 @ \$11 for No. 2 Plain, at tidewater. Southern Iron, same delivery, \$11.50 @ \$12 for No. 1; \$10.50 @ \$11.25 for No. 2; \$10.25 @ \$10.75 for No. 3; \$10.50 @ \$10.75 for No. 3 Soft, and \$10.75 @ \$11 for No. 1 Soft. Foundry No. 4 (Foundry Forge) is \$10 @ \$10.40.

Splegeleisen and Ferromanganese.—In the absence of business we quote

nominally \$20.50 @ \$21 for 20% Splegeleisen and \$48 @ \$50 for Ferromanganese, tidewater.

Billets and Rods.—Some time ago there were reports that Chicago Billets had been sold in New England. These probably grew out of the fact that a large block of Billets from the Chicago district were sold at that time to a Wire Rod mill in Eastern Pennsylvania. Wire Rods are easier. We quote, tidewater delivery, Steel Billets, \$18 @ \$18.25, and Wire Rods, \$25 @ \$25.50.

Steel Rails.—Nothing has been done in standard Sections, the selling continuing a waiting policy, so far as 1895 delivery is concerned. C. P. Huntington is reported to have bought 6000 tons of Cammell Rails at a low figure for San Francisco delivery. About 2500 tons of English Rails have also been sold for a Canadian road.

Track Material.—We quote as follows for small lots: Spikes, 1.50¢ @ 1.70¢; Fish Plates, 1.20¢ @ 1.40¢; Track Bolts, Square Nuts, 2¢ @ 2.10¢, and Hexagon Nuts, 2.10¢ @ 2.30¢ delivered.

Manufactured Iron and Steel.—A local architectural works has taken the contract for the erection of the Guggenheim Building, the Beams, about 3500 tons, going to a Pittsburgh mill. Bids on the Cast Iron Columns, about 1200 to 1500 tons, were made on the basis of both city and out of town foundry, the former, although higher, being taken. It is claimed that the out of town foundries are not as careful and experienced in their work as they should be. Some very low prices have been named lately on Flange Plates, the figures being but little better than those usually quoted on Tank Steel. We quote: Beams up to 15-inch, 1.30¢ @ 1.50¢ for round lots; Angles, 1.25¢ @ 1.35¢; Universal Mill Plates, 1.25¢ @ 1.35¢; Tees, 1.40¢ @ 1.60¢; Channels, 1.35¢ @ 1.50¢, on dock. Steel Plates are 1.25¢ @ 1.40¢ for Tank; 1.40¢ @ 1.50¢ for Shell; 1.60¢ @ 1.65¢ for Flange, and 1.75¢ @ 2¢ for Fire Box, and 2¢ @ 2.25¢ for Locomotive Fire Box, on dock; Refined Bars are 1.15¢ @ 1.9¢, on dock, and Common 1.05¢ @ 1.15¢; Soft Steel Bars are 1.10¢ @ 1.30¢; Scrap Axles are quotable at 1.30¢ @ 1.50¢, delivered; Steel Axles, 1.30¢ @ 1.50¢, and Links and Pins, 1.40¢ @ 1.60¢; Steel Hoops, 1.40¢ @ 1.50¢; Best Iron Boiler Rivets, 2.90¢ @ 3¢, delivered; Cotton Ties, 67¢ @ 75¢ \$45-lb bundle, tidewater; Machinery Steel, 1.20¢ @ 1.40¢; Toe Calk, 1.60¢ @ 1.70¢, and Sleigh Shoe, 1.15¢ @ 1.25¢; Tire, 1.25¢ @ 1.30¢, and Spring, 1.65¢ @ 1.70¢, delivered.

W. H. Wallace & Co., Manhattan Life Insurance Building, 66 Broadway, have been appointed agents of the Pencoyd Works, A. & P. Roberts & Co., Pencoyd, Philadelphia, makers of Shapes, Bars and Axles, and builders of bridges and structures.

The Niagara Falls Power Company have a neat way of obtaining the quantity of water used by each mill supplied with hydraulic power. To ascertain the consumption the wheel itself is used as a meter. Having once ascertained the discharge of the wheel at several different gate openings, under a known head, by weir measurements, a daily record of the gate opening and head acting on the wheel gives the data by which the amount of water used can be readily computed.

Metal Market.

Pig Tin.—Prices have dropped during the week to as low as 14.65¢ for spot stock. Some sales and several settlements were made on that basis for prompt and current month delivery. Not a little Tin was turned at corresponding prices for later delivery. Distant futures were offered relatively as low, or at 14.70¢. There has not been as much business this week as there was last on speculative or other account. Evidently many jobbers and large consumers who purchased liberally at about 15 50¢ have enough stock to meet pressing wants and something to spare. In any event they do not figure as liberal buyers at the present time and values have little support aside from what comes through covering of short sales or speculative manipulation. The market, in fact, still appears to suffer from the weight of abnormal heavy supply, due chiefly to the syndicate attracting supplies from primary points and incidentally getting more than average supply into the hands of jobbers and consumers. Wednesday's market was somewhat firmer in tone, although spiritless, with bids made up to the basis of 14.80¢ for prompt and near future delivery.

Copper.—No change of importance has taken place. Business is moderate since consumers are being supplied to a great extent through deliveries making on old contracts, while export demand continues moderate. There is no pressure to sell, but enough stock is offered to keep prices rather easy at 9.50¢ @ 9.60¢ for Lake Superior Ingots, 9.40¢ for Electrolytic and 9.20¢ @ 9.30¢ for common casting stock.

Pig Lead.—Prices have remained almost stationary during the week, and business has been of moderate proportions. At the present time the demand is light, and consumers' bids are almost invariably about 0.10¢ below sellers' ideas on round lots. Carload purchases were made at 3.10¢ @ 3.12½¢, and those prices are now generally asked.

Spelter.—Transactions here are still on a moderate scale, and the demand continues light, with no call to speak of for larger quantities than single car-loads. A few speculative contracts were closed out at 3.37½¢, but on ordinary Western brands about 3.40¢ @ 3.45¢, regular terms, is doubtless nearer to market value. Special brands bring about the usual premium.

Antimony.—Offerings have been free and sufficient to carry prices somewhat lower. During the week sales were made at 8½¢ @ 8¾¢ for Cookson's and 7½¢ @ 7¾¢ for Hallett's.

Nickel.—The range of 35¢ @ 42¢, as to size of order, is still quoted.

Tin Plate.—Neither prompt or future deliveries have been taken in large blocks, but numerous purchases of fair sized lots made up a very good volume of business. Prices have varied but slightly and still lean somewhat in buyers' favor. For spot stock the quotations are: Charcoal Tins: Melyn Grade, one-half X IC, \$6; IX, \$6.50; Llswane, &c., IC, \$4.30; IX, \$5.25; Al-loway Grade, \$4.25; IX, \$5.05; Siem-ways Steel, IC squares, &c., full weight, \$4.37½ basis; 100 lb, \$4.10 basis. Bessemer Steel, IC squares, &c., full weight, \$4.30 basis; 100 lb, \$4 basis. Coke Tins, IC, 14 x 20: Bessemer Steel, full weight, \$4.12½; 100 lb, \$3.77½; 95 lb, \$3.67½; 90 lb, \$3.57½.

Charcoal Ternes: M. F., IC 14 x 20, \$6; IC 20 x 28, \$12; Worcester, IC 14 x 20, \$4.75; IC 20 x 28, \$8.60; Alyn, full weight, IC 14 x 20, \$4; IC 20 x 28, \$8.05; Alyn, 100 lb, IC 14 x 20, \$3.85; IC 20 x 28, \$7.60; Desn, full weight, IC 14 x 20, \$4.05; IC 20 x 28, \$8.10; 100 lb, IC 14 x 20, \$3.90; IC 20 x 28, \$7.80; D. R. D. Grade, full weight, IC 14 x 20, \$3.90; IC 20 x 28, \$7.85; 100 lb, IC 14 x 20, \$3.85.

British Metal Market.

[Special Cable Dispatch to The Iron Age.]

LONDON, October 31, 1894.

Pig Tin has steadied at a somewhat lower level of prices and quite a large speculative business has been effected. Early in the week there was good support from the bull interest and outside buying, but the market subsequently weakened under the influence of adverse reports from New York and many long accounts were closed. During the past few days there has been some hardening under the influence of better demand for Straits, chiefly forward deliveries. To-day the market has been moderately active, with prices at £68 for prompts and £68. 2/6 @ £68. 5/ for three months' futures.

Copper has undergone very little change. Business was dull and speculation exceedingly tame until near the close of the week, when buying orders were stimulated by reports of probable reduction in exports from the United States. Late dealings in Merchant Bars were at £40.12/6 @ £40.15/ for prompts and £41 for three months' futures. Best selected English quoted at £43.15/ @ £44.

Tin Plate market has been dull and prices are weak, owing to increased production. Forward business is restricted by lowness of buyers' offers. Light weights are much cheaper. The Llanguenech Works will restart shortly. Swansea quotations are as follows:

Bessemer Cokes, IC..... 10/ @
Siemens Cokes, IC..... 10/3 @
J. B. Steel Cokes, IC..... 10/ @
Dean Ternes, 20 x 28..... 20/ @
Charcoals, IC..... 11/ up.

Pig Lead is steady at £9. 15/ @ £9. 17/6 for Soft Spanish, but meets with only moderate sale.

Spelter has remained at £15 @ £15. 2/6 for ordinary Silesian, and is in fair demand.

Pig Iron warrants have remained very steady. Late dealings were at 42/6 @ 42/7 for Scotch, 35/6 @ 35/7½ for Cleveland and 43/6 @ 43/7½ for Hem- atite.

F. H. DeBardeleben, who has been first vice-president of the Tennessee Coal, Iron & Railroad Company, Nashville, Tenn., since their consolidation with the former DeBardeleben Company, has resigned. Mr. DeBardeleben will probably give his entire attention to the plan of building basic steel works at Bessemer, Ala.

The hearing of the case against the officials of the Penn Steel Castings & Machine Company, Chester, Pa., who are charged with a conspiracy to defraud the Government in the supply of

gun castings, which was set down for October 24, was again postponed, owing to the absence of a Government witness. The inquiry will be resumed in Philadelphia by United States Commissioner Bell on November 8.

A press dispatch, dated Duluth, Minn., October 23, states that the Minnesota Iron Company have concluded to take up the option given them by the Roucheleau-Ray Iron Company to one of the best mines on the Mesaba range. It is an 80-acre tract, and the company buy it outright for \$200,000. Pits have been sunk 110 feet deep in solid ore of first quality.

The following item, taken from the last report of the Bureau of Steam Engineering, United States Navy, forcibly illustrates the shortsightedness sometimes practiced by Congress in making appropriations: The railroad track in this yard [New York] is, in general, entirely too light, being mostly of ordinary street rails, so that when a boiler or other heavy weight has to be moved "skidding" has to be resorted to, which greatly increases cost as well as causes delay. As an example of the cost of "skidding," it can be stated that to move the "Cincinnati's" boilers from the shop to the ship by this method cost over \$3700, enough to have laid a substantial track the entire distance.

The tests of coal carried on at the New York Navy Yard consist in running a marine boiler for 24 consecutive hours with the coal to be tested under as nearly as possible the conditions of actual service. The same boiler is used in all the experiments and the same firemen employed. The rate of combustion is 12 pounds of coal per square foot of grate per hour; all the water evaporated and coal burned is carefully weighed; steam is carried at a uniform pressure; ease or difficulty of firing with the coal under trial noted, as well as the character of the flame, smoke and deposit. In short, a complete record is kept of everything that will enable a just estimate to be formed between the different coals.

Steel is gaining ground as the material for beams in Belgium. During the first nine months of the current year the exports of beams from Belgium were 29,457 metric tons of iron and 10,982 tons of steel. Last year, during the same period, the exports of iron beams amounted to 4023 tons while the shipments of steel beams figured up only 4337 tons.

Inverted arc lamps for interior lighting have been introduced in the mills of the Goff Braid Company, at Pawtucket, R. I., and with very satisfactory results. In this system the ceiling of the room is kalsomined or whitewashed. The arc lamps are placed as high as possible and beneath them is placed an inverted cone shaped reflector, which cuts off direct view of the arc from any part of the room and reflects the light to the ceiling, from which it is again reflected to the room. The system gives a more uniformly distributed light than any other in use and is claimed also to give some 40 per cent. more light for the same consumption of current. In the Goff mill seven arc lamps furnish light for a room 50 x 200 feet, or 1430 square feet per lamp. It should be said that there are few belts or columns in the room, and were the lights thus obstructed more lights to the area would doubtless be necessary.

HARDWARE.

Condition of Trade.

IN THE hand-to-mouth manner which has become so universal of late a good many goods are going out steadily, but there seems little disposition on the part of either retailers or jobbers to order beyond their immediate requirements. This state of things will naturally continue until prices have plainly reached bottom.

Chicago.

(By Telegraph.)

October has been a good month for Shelf Hardware. Orders were not large, but have continued to come in very freely. The country trade have shown no disposition to anticipate requirements, but the demand from their customers has been sufficiently steady to compel the constant sorting up of stocks. The end of the month compares very favorably with the beginning, and taking the entire period a distinct gain is reported in the volume of business over that of September and very much in excess of that of October last year. Trade would have been still better recently if the weather had been more in accordance with the time of the year, but the temperature has been high and there has been little use for stoves or heating apparatus, and consequently stove furniture and trimmings have been comparatively neglected. Trade in Tinware and Stamped Ware is hampered by difficulty in getting shipments from factories. The impending tariff changes caused fewer goods to be made during the summer and fall, while retailers also held back their orders, so that jobbers are now in hot water trying to supply the strong demand. The same remarks can be made with regard to Tin Plate. Stocks in Chicago are being drawn upon heavily to supply deficiencies at other points in the West. Jobbers have latterly been in receipt of carload orders for Tin Plate, which is something quite unusual. Heavy Hardware is in fair condition, the trade of the month being a little larger than in September, but prices on all goods carried in this line are now cut so close that the increased volume is not reflected in augmented dollars and cents.

St. Louis.

(By Telegraph.)

The Hardware jobbers of St. Louis have reason to feel satisfied with the month just closed. Interviews with all the jobbers prove that September was without doubt the heaviest month of the year, some of the houses being

compelled to work a night force five nights of each week during the entire month. A favorable feature of the demand is the number of new stocks sold during the past 30 days, showing a feeling of confidence and improvement which it is pleasant to note. Prices, unfortunately, cannot be referred to as being in a satisfactory condition, many lines being quoted lower from week to week, and, as noted in our last report, even staple goods are feeling the effect of the falling market. The latter phase of the market will tend to cause many jobbing houses to deal more largely in specialties. In this connection the matter of Bicycles is interesting. The sales of Bicycles during the year up to October 1 were phenomenally large and jobbers are already preparing for the coming season. The retail Hardware dealer has also found this a money making line to handle, and the indications are that the season of 1895 will find the Hardware trade handling Bicycles more largely than ever before. Notwithstanding the lateness of the season a good demand for Builders' Hardware is reported, and in the way of Tin Plates, Black and Galvanized Iron, Holiday Goods, &c., a brisk trade is reported. Oil and Gas Stoves are selling two to one in comparison with last year.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—Business is active, though not specially brisk. Orders are still larger in number than in size, and the volume of trade is not quite what the order register would indicate. Business is, however, on the right side, and jobbers are content to go along in this way till they see more clearly as to prices that are likely to prevail and also how collections round up; 40-cent to 45-cent wheat in the Dakotas and 15 cents per bushel for wheat to the farmer in Washington do not indicate very plethoric pocket books for him, and after all it is mainly to the farmer that we must look for the money that is to turn the wheels of factory and of commerce.

We often wonder that his generally scanty means go so far and accomplish so much. It is not wholly unlike the poor widow's barrel of meal.

The demand for Builders' Hardware has exceeded expectations this fall.

There has been a considerable number of large buildings under construction this season in some of the larger towns, which have called for Hardware furnishings of even a better quality than usual, which is due in part to low prices.

In other lines there has been no special activity, but generally a steady going, every day trade. But little demand or inquiry for car lots in Barb Wire or Nails, but a steady call for small lots. Stove Boards are selling

slowly, due in part to "off figures" from certain parties, and also to the exceptionally fine weather which has characterized the entire month of October.

Collections continue good.

Omaha.

LEE-CLARKE-ANDRESEEN HARDWARE COMPANY.—We still have to report a continuance of a free movement of staple lines and seasonable goods during the past two weeks. That the demand should keep up in the face of very warm and pleasant weather indicates a very encouraging future, as it is conceded that colder weather would certainly stimulate the demand for all kinds of seasonable goods.

Considering the general conditions affecting a considerable portion of that section of the country tributary to this market, the above conditions are decidedly encouraging.

Collections have also been pretty fair, though it has been necessary to give considerable attention to this branch of the business in order to keep everything up close.

Baltimore.

CARLIN & FULTON.—The recurrence of the dates for these letters comes much more rapidly than the changes in trade which they are supposed to record.

During the present month there has been the usual activity in our nearby territory, and there has been probably an improvement as shown by the number of buyers who have visited our city, instead of relying upon the traveling salesmen for their purchases; but we regret that in the cotton States there is great complaint of dull times, the result of the unprecedented low price for cotton.

The planter undoubtedly has much to complain of in regard to the price, but he is apt to overlook the fact that his product is extraordinarily large, and the purchasing power of the bale of cotton at to-day's low figures is nearly as great as when it was 50 per cent. higher.

It seems somewhat strange that while owing to the so-called hard times the demand for mechanics' tools has been greatly curtailed, showing either the scarcity of work or the economy of the workman, the demand for Ammunition has never been so great, suggesting either great pleasure or an abundance of money to be devoted to the sport of hunting. The demand for loaded Shells has greatly exceeded the ability of the factories and the jobbers to supply the goods, which is probably, as far as profits are concerned, not to be much regretted; and yet while the manufacturers bewail the amount of business done in this item of loaded Shells at a positive loss, the mystery is why do they continue it. Would not a continued loss suggest a uniform advance?

Collections continue fair, and the low prices which rule for everything enable business to be done with much

less money than when not only purchases were liberal, but values doubly high.

Boston.

BIGELOW & DOWSE COMPANY.—The depression in other lines of goods does not seem to reach the wholesale Hardware dealers in New England. All are busy and the volume is greater than it was at this season last year. Merchants in the country are doing a fair business and salesmen's orders are well assorted. The times are slowly changing for the better. Mills are generally running on full time and labor is well employed. There are no marked changes in prices, which still rule very low.

The settlement of the tariff has made a marked improvement in the sales of Cutlery, Scissors, &c. The trade runs largely to the cheaper lines and very attractive patterns of Pocket Knives are sold to retail for 25 cents. The demand has exceeded the expectation of the importers and stocks are running low.

The Skate trade is very brisk and factories are running overtime.

There are some orders being placed for Wire Cloth. Dealers will look out ahead this year, as there is a probability that there will be a short supply as last year and an advanced price later in the season.

Many orders are being placed for Sleds and Snow Shovels.

The Bicycle trade will open early this year and manufacturers are not holding off in making prices as they have in years past. It is reported that the Columbia Bicycle is to be sold for \$100 this year in place of \$125 last year. The Western Wheel Works say: "We know what it costs us to build a Bicycle," and advertise to make the same prices as last year. Generally the "95" wheel will be lighter and handsomer than the "94" patterns. The prices of the medium grade wheels will be about the same as last year but the machines will be greatly improved. Some of the medium grade wheels will be so improved as to equal if not excel many of the high grade (so-called).

Money is a drug at the banks, but it is scarce in the country and remittances are not what they should be.

New Orleans.

A. BALDWIN & Co.—There is no improvement noticeable in the condition of trade in this section. Business is about on a par with this month last year, but this is not very encouraging. Politics and the extremely low price of our leading staples have had their effect on the business situation. Orders are plentiful enough, but the volume is not very great. There is no special feature in any line that would call for special attention. We do not look for very much of an improvement until the new year.

San Francisco.

MILLER, SLOSS & SCOTT.—While we have for some time past noticed a gradual increase in the volume of business, we at this time can report a rather more noticeable spurt. Business in all lines has been exceedingly active for the last few weeks, with fair prospects of continuation. At any rate, our people are talking more hopefully and have realized that the country has not gone to the dogs yet.

Though collections have not noticeably increased, we consider that they are fully up to the average of previous years.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—There has been but little change in the general situation of trade and no new features have developed since our last letter, but it is certainly refreshing to be able to report a continuance of fair trade with fairly well sustained activity, but at the same time we must admit that it is quite necessary to let no opportunity escape where one sees trade in sight. We think the efforts of the successful salesmen have never been so vigorously employed in order to make a respectable showing as during the last two months. Trade for the last fifteen months had been moving along so sluggishly that the salesmen had but little heart or courage to fight the uneven battle which had been waging during the stagnation of trade with so many odds against them, and we admit it was discouraging to the most sanguine and heretofore successful salesman, and not until the tariff issue became a matter of record and upon the statute books, with outward indications of its being a settled policy, could country merchants be induced to make purchases beyond their daily wants. They were as immovable as a well built stone wall, and were stubbornly unwilling to replenish their depleted stocks and empty shelves, but the adjournment of Congress gave a more hopeful feeling, and salesmen once more became eager for the battle of life.

A thorough American citizen is certainly the most patient, uncomplaining and law abiding citizen in the world, doubtless from the fact of his voting on his own destiny; consequently, whatever way the elections are decided, he is quite willing to settle down to the inevitable results. How foreign countries must wonder at the characteristics of the American people, and what a lesson the last two years has been both to this and foreign countries, who have looked on during the changes of the last two years, and how indelibly it will hereafter be stamped upon the memory of millions. While we do not agree with the assertion recently made by a prominent partisan that "this country needed just such a lesson," we do know that "experience is the best teacher," and, though dearly bought experience, the entire country will come out of the last two years' struggle better informed, although with less money and far less confidence in the partisan and professional politician.

While the brightest minds of both parties have been at variance upon questions which are of vital importance to us as a people and a nation, and while as a whole the majority of the voters of both parties have been influenced in their belief, the professional politician, and even the partisan papers, in order to place their party friends in power, as well as increase their daily issue, have shown themselves willing to stultify both themselves and their party in statements quite contrary to the facts of the case.

Our State election occurs November 6, and not only our State but the adjoining State of New York are again in the midst and height of another exciting political campaign, which means interrupted trade for a couple of weeks, and from this the business interests will suffer correspondingly. These same conditions exist in other States and betting is rampant on the political harvest. Elections are usually business disturbers, and it is most unfortunate for the business prosperity of the country that they occur so frequently

and especially is it unfortunate that the tariff has recently been made such a vigorous party issue. While there are men of intelligence in both political parties who believe in moderate revenue duties upon all imported articles and others in both parties who believe in higher rates of duty on goods manufactured in this country, the months and months of tariff legislation have shown how widely apart in their views have been the leaders and advocates of indiscriminate changes. Not only were hot words and abusive language of daily occurrence in the Halls of Congress, but even the President was assailed by his heretofore political and personal friends. A retention of former duties was advocated by those representatives whose constituents were interested in the manufacture of certain articles, but in other districts reduced duties were demanded, and so on through the line. During this time it has been a matter of interest to notice the general change of views which resulted in the Gorman tariff.

We certainly have passed through two years of experience, which should entitle the country to relief from further agitation, but is it the case? A nominee for Governor of Pennsylvania, now stumping our State, while not in full sympathy with the present tariff, has openly stated, "We have seen the end of tariff legislation for the next 15 years;" but a conspicuous leader of the same political faith, in a State with less manufacturing industries, has intimated "We have only seen the beginning of tariff legislation." The President refused to give paternal sanction and refused to sign the tariff bill, but referred to it as an act of perfidy and dishonor. Further, the changes in duties made by Mr. Wilson after months of careful preparation, were blocked by a stone wall of amendments—over 600. General Hancock, when the Presidential nominee, stated that the tariff issue was purely a local issue. How truly he illustrated the workings of his followers in the last Congress is too fresh in memory to discuss, all going to prove how unfortunate for the prosperity of the country that the tariff should be made a vital party issue.

We regret to say collections are not up to what one would expect at this time of the year, which shows evidence of many of the agricultural districts holding back their product, hoping for better prices. While we think it unwise for agriculturists to enter into speculative anticipations (we should think experience would have taught them differently, because the tendency has been downward for some years), yet we all sympathize with them in any hesitation to dispose of their entire product at such low figures compared to the cost of producing the same.

Louisville.

W. B. BELKNAP & Co.—We can report a good volume of business. The demand is generally distributed, and the goods thoroughly assorted. No orders of unusual size seem to come to the market, as very few concerns are embarking in business, just as there are no great new enterprises on foot; but the replenishment of stocks on the part of those already engaged is a matter of absolute necessity and the monthly aggregate of business is not disappointing when it comes to be added up and compared.

The fact that so many rolling mills are so well employed is a most encouraging feature. To be sure, every now and then one moves out of the procession, via a receivership, but the loss

occasioned there is trifling compared to the gain by reason of modern improved methods for multiplying output. Every visitor that we have from the iron producing centers brings stories of increased tonnage within a given time, and the only wonder is that the country absorbs the vast amount that is being turned out by the manufacturers actively engaged.

Owing to the fact that city shops have been doing so little work for a long time, the supply of good scrap is said to be rapidly diminishing and more pig and muck bar called for. This will lead possibly to improvement in prices in the near future. In fact, some mills are asking a little better price now. In localities where the main competitor is the receiver, the appointee of the United States Court, who has no back debts to worry about or provide for, it is difficult for solvent concerns to obtain a fair price which will enable them to pay 100 cents on the dollar as agreed and a reasonable profit on the investment. It would seem as though the matter of receiverships had been greatly overdone. It would be better for the business interests of the country at large if when a concern fail they were sold out and reorganized. That puts them on a business basis at once and those actually interested in them have the management and are naturally imbued with a desire to make a fair profit, or have to stand the loss if such is made. Whether we get a general bankrupt law or not, this matter of receivership, with indefinite term of office, should certainly attract the attention of those who look after the business interests of the country.

The market has been some little disturbed by the appearance of an individual Wire Nail Card, which for a short time purported to be the ideal card, offering all sizes at a price irrespective of assortment. But it is known that only a moderate range of sizes can be supplied, and those mainly small.

The effort of the bar mill manufacturers in Indianapolis to do away with the irresponsible price maker, who neither makes nor carries stock, and who guarantees nothing, is a very commendable one. It is in the hands of the manufacturers themselves, and we hope that they can achieve something definite and lasting.

Notes on Prices.

Wire Nails.—If prices were more settled, the market for Wire Nails would be in a very satisfactory condition. Inquiries are numerous and the amount of sales considerable. Ninety-five cents, f.o.b. at mill, for carload lots, is still quoted, while 90 cents is becoming a common price for Eastern buyers. We have been requested by several members of the Wire Nail Association to contradict the report which has obtained currency in the trade that the association have adopted the Baekes card.

Chicago, by Telegraph.—The situation is quite perplexing in the matter of quotations. The standard mills are endeavoring to hold up their price to a basis of \$1.10, Chicago, for shipments to Western points, but others are making rates considerably below this price, and thus demoralize the market. It is understood, however, that the low quotations made are invariably for spot cash, which is not specially tempting to those who place orders expecting to

draw out in small quantities as they feel inclined to make specifications. It is reported that an idle factory in this vicinity has been leased and may be in operation within a short time to still further increase the oversupply of Wire Nails. Jobbers are quoting small lots from stock at \$1.10, but report that trade recently has not been very active.

Cut Nails.—The market for Cut Nails is quite as strong as at our last writing. While the demand is good, there is active competition for desirable orders. The quotation of 90 cents for carload lots on dock, New York, 60-cent average, fairly represents the market. Small lots from store in New York are quoted \$1 to \$1.05, with the usual average.

Chicago, by Telegraph.—Manufacturers report that orders are coming in just as they have been for some weeks, in small quantities, yet with sufficient frequency to keep the local works well employed. Factory prices are unchanged at 90 cents, Chicago, for 60-cent average, while small lots are selling at \$1 from stock.

Barb Wire.—There is little present delivery and the interest in the trade centers in the efforts of manufacturers to secure orders for future delivery. The market is represented by the following quotations on Four-Point Galvanized in carload lots, at the points named: Pittsburgh, \$1.95 to \$2; Cleveland, \$2 to \$2.05; Cincinnati, Allentown, Chicago and New York, \$2.10 to \$2.15.

Chicago, by Telegraph.—Inducements are being made by some of the manufacturers to stimulate the placing of orders for spring delivery. These inducements are not always in the matter of price, but extend to the enlargement of credits and the dating of bills a considerable distance ahead. It is not believed that this effort has met with much success, as merchants are not yet inclined to load up with goods even if they seem to be cheap. They have had considerable experience of this kind within the past three years, to their regret. The demand for early delivery has been a little better the past week or two owing to the extremely pleasant weather, which enables outdoor work to be prosecuted, and jobbers are also benefited by the increased movement. Small lots of Galvanized from stock continue to be quoted at \$2.25, with \$2.15 named for shipment direct from factory.

Western Autograph Register.—This Register was illustrated in our issue, 18th ult. It is manufactured by the Western Autographic Register Company, 927 and 929 North Eleventh street, St. Louis. The Register is sold at \$15 each.

Parker Heater.—The Parker Portable Heater, manufactured by the Charles Parker Company, Meriden, Conn., and 97 Chambers street, New York, an illustrated description of

which appears in this issue, is sold at a discount of 50 and 10 per cent. from the following list:

No.	
3.	Nickel Finish.....
4.	Polished Nickel Plated.....
	21.00

Christmas Tree Holder.—The Berlin Christmas Tree Holder described in our last issue and put on the market by the Logan & Strobridge Iron Company, New Brighton Pa., is sold to the trade at \$4.25 per dozen, net.

Glass.—There is little of interest to report in the American Glass market as about the same condition of trade exists as was reported last week. Local demand is limited, though factories report indications of improvement. It has been noticed that Glass is among the last lines to be affected in a general business depression, and that it is also among the last to feel a revival of trade. Prices from factory are reported as being firmer than for the past few weeks, though there is no indication of an advance. Pittsburgh quotations are given as 88 per cent. discount for single and 90 per cent. discount for double strength Glass in carload lots. The New York price in small lots is 85 and 10 per cent. discount for both single and double strength Glass. Imported Glass is sold at a discount of from 60 and 10 and 5 to 70 per cent. from the list of October 1. In American Plate Glass the demand shows somewhat of a falling off, and factories report that nearly all contracts have been filled, though prices remain steady.

The Hardware Club.

IT has been decided by the House Committee to open the Club rooms at 6 p.m. on November 6 to members and their friends. Arrangements have been made with the Postal Telegraph Company to furnish bulletins of election returns by direct private wire to the club rooms. The restaurant will be kept open as late as necessary for the accommodation of members and guests.

The following gentlemen were elected members at a meeting held October 26:

JOHN F. ANDERSON, JR.,
34 Beekman street, New York.
OLIVER P. BUEL,
261 Broadway, New York.
JOHN DAY,
H. L. Judd & Co., New York.
GEORGE A. DRIGGS,
Waterbury, Conn.
EDWARD HASSETT,
271 Broadway, New York.
W. B. A. JURGENS,
Brooklyn, N. Y.
WILLIAM LANGDON,
5 Beekman street, New York.
CHARLES K. PADDOCK,
Paddock & Kleine, New York.
J. ALBERT VAN WINKLE,
Paterson, N. J.

The Hardware Club is the fortunate possessor of a large, fine oil painting which is being very much admired,

entitled "The Shepherd and his Sheep," by Henrie de Buel, Brussels. It has become the property of the club through the generosity of one of its members, Charles Morrill, who contributed it from his large collection. It is a pastoral scene, representing a shepherd leaning on his crook, with a flock of sheep and two dogs in the foreground. This picture, which is handsomely framed, has very appropriately been hung in the main hall beyond the office. Through the courtesy of artist N. A. Moore of Kensington, Conn., six oil paintings from his collection have been loaned to the Club and have been hung in the two large committee rooms. They portray some fine views of lake and mountain scenery, two cattle pieces and one picture entitled "Breakfast for Two." In the latter an old man smoking a clay pipe is seated in a chair before a cook stove preparing a frugal meal, evidently for himself and his dog, who sits patiently by. Suitable resolutions have been adopted by the Governors thanking the donor. There are a number of other pictures which, it is said, will be loaned to the club, and which it is hoped will soon be on exhibition.

Hardware Notes at the Convention of the Carriage Builders' National Association of the United States.

THE ANNUAL CONVENTION of the Carriage Builders' National Association of the United States was held at Industrial Hall, Philadelphia, on October 16, 17 and 18, with a very large attendance. A leading feature at the convention was the manufacturers' exhibit, which occupied the whole of the main hall, and was said to be larger than any exhibit made at previous conventions.

Carriage Hardware of course formed the major portion of the exhibit, and attracted much attention. Novelties were not wanting, and most of them were shown for the first time.

The Wilcox & Howe Company, Birmingham, Conn., showed an excellent line of Carriage Hardware. The Acme Step Pad recently introduced by them was very favorably noticed by the builders. It is distinguished from the ordinary Step Pads by the serrations, the outer ring being high and the other rings reducing in height toward the center in order to insure a safe foothold.

The Russell & Erwin Mfg. Company, New Britain, Conn., had a well arranged stand and exhibited their patent Reverse Helicoid Tire, Sleigh Shoe, Shaft and Agricultural Bolts and Wood Screws. The advantages of these goods were fully explained and samples distributed.

Butts & Ordway, Boston, Mass., were located near the entrance hall, and showed B. & O. Sure Grip Horse Shoes, Foot Vises, Larrabee Roller Chafe Irons, claimed to be the only wear irons which can be used with rubber or pneumatic tires; Boston Tire Binders, B. & O. Sure Grip Tire Up-setter, and the new B. & O. Triple Punch, illustrated in *The Iron Age* October 18.

Baeder, Adamson & Co., Philadelphia, in a handsome showcase, showed a sample line of Glues, Curled Hair, Flint Paper and Emery Cloth.

The H. D. Smith Company, Plantsville, Conn., had a large space devoted to a line of Plates, Couplings, and general coach goods, including their rubber lined Pole Sockets and a wrought iron Stake Holder for wagons.

The National Hardware Company, Philadelphia, demonstrated the advantages to be found in their Safety Pole and Whiffletree Tips.

W. & H. Rowland, Frankford, Philadelphia, had a large exhibit of Carriage Springs, and by a simple contrivance showed their qualities as regards ease and comfort.

C. Cowles & Co., New Haven, Conn., showed Step Plates having bars supported top and bottom of plates; ball bearing Whiffletree Couplings, with compensating adjustment; and a Trace Post for use on a stiff draw bar, and adapted for use in connection with an ordinary whiffletree trace.

The Boss Lock Nut & Coupling Company, 50 Broadway, New York,

The J. A. & D. P. Cooper Company, Struthers, Ohio: Bent Rims, Shafts, Singletrees, Poles, Yokes, &c.

P. D. Randall & Son, Troy, N. Y.: Randall's new valve adjusting Bolt and Rivet Clippers.

The Herbrand Company, Fremont, Ohio: Body Loops and Gear Irons.

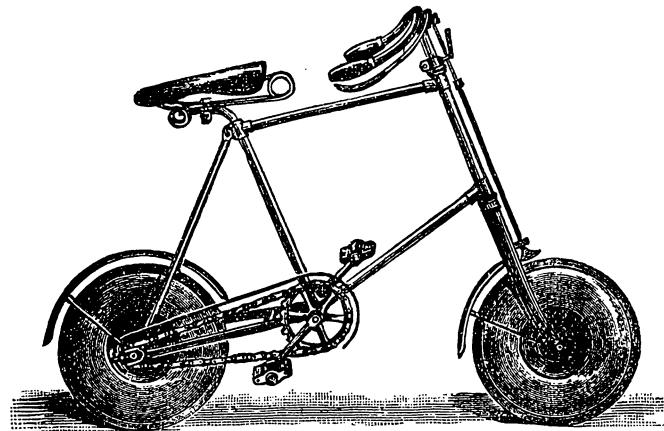
Buckeye Mfg. Company, Anderson, Ind.: Ironed Poles, Shafts, Straps, &c.

The Union Hardware Company, Union, N. Y.: Double Drop Purse Plates and a general line of Heavy Carriage Hardware.

The Snowflake Axle Grease Company, Boston: Snowflake Axle Grease in a variety of packages.

Pneumatic Wheels.

The accompanying cut represents an English idea of pneumatic wheels, which are offered by the Pneumatic Wheel



Pneumatic Wheels.

showed their improved adjustable Lock Nuts and Shaft Couplings.

Keyser & Rogers, Philadelphia, had a well arranged exhibit covering a line of Carriage Hardware and coach and four in hand supplies. As novelties they showed a new Felloe Plate, which passes completely around the wood and is designed to prevent the ends of felloes from bulging; a Ventilator for brougham tops, and a Spoke Lock for fastening loose spokes or preventing spokes from becoming loose.

Other exhibitors were, the Raymond Mfg. Company, Corry, Pa.: Raymond steel drive and wire drive Anti-Rattlers, Keystone wire Anti-Rattlers and Axle Washers put up in packages containing sets for various sized Axles.

The Martin Singletree Clip Company, Evansville, Ind.: Clips and Anti-Rattlers.

Pratt & Letchworth, Buffalo, N. Y.: Corrugated steel Fasteners for making joints and preventing splitting and cold rolled steel Hub Bands.

Pomeroy & Hatch, Hartford, Conn.: Anti-friction ball bearing Axles.

The Queen City Forging Company, Cincinnati, Ohio: A general line of Carriage Hardware.

Fisher & Wiestling, Philadelphia: Woodward cork Axle Washers.

The Lancaster Cork Company, Lancaster, Pa.: Cork Axle Washers.

The Cleveland Hardware Company, Cleveland, Ohio: Rolled steel Wagon and Carriage Hardware.

The Cleveland Axle Mfg. Company, Cleveland, Ohio: Axles and a new Rein Holder.

The Eberhard Mfg. Company, Cleveland, Ohio: General line of malleable iron Carriage and Wagon Hardware.

Willis E. Miller, New Haven, Conn.: Dansereau improved Collinge Patent Axle.

Company, 2 Gresham Building, London. Among the advantages claimed for this style of wheel are the absence of spokes, destroying of vibration, immunity from punctures and reduced weight. Testimonials indicate that the wheels are light and that they run well, also that they enable high speed to be obtained over rough roads. The point is made that the wheels are also applicable for hand trucks, perambulators, invalid chairs, ambulances and all road vehicles.

SPRINGFIELD LEVEL & TOOL COMPANY, Springfield, Mass., have recently commenced the manufacture of a line of Carpenters' and Machinists' Levels and will make a specialty of Solid Set Levels. The goods are of new design and, it is claimed, will excel in accuracy. An Inclinometer also is in preparation and will soon be on the market. J. P. Noonan, for a number of years with Davis Level & Tool Company, is manager of the new concern.

An English paper reports that Birmingham manufacturers of copper wire have good reason for their complaints of the rapid development of French competition in England. Several leading French companies, acting as a syndicate, recently effected extensive contracts with American firms for copper at £3 per ton below existing rates. Fortified by this advantage, the agents of the syndicate's firms are now offering copper wire for telegraph and other purposes wherever needed in England at less money than Birmingham manufacturers can produce it for, and contracts are being accepted for the whole of 1895.

Bicycle Notes.

The Price of Bicycles for 1895.

DURING the past week a number of Bicycle manufacturers, have, under the pressure of popular demand, announced their prices for 1895, and have thus relieved the Hardware trade of any uncertainty as to which direction prices would take. The most noticeable of these announcements, because of the prominent position the company have always held in the Bicycle trade, also because of the price announced, comes from the Pope Mfg. Company, stating that the standard price of Columbia Bicycles for 1895 will be \$100. The announcement is in the form of a circular letter to their agents, under date of October 23.

The company remark that their action in this very important matter is taken after the most careful weighing of all proper considerations bearing upon it, though they have not been influenced, any more than in the past, by the possible action of any other makers. They believe that the time has come for the last considerable reduction of the price to the public on all Bicycles. It has always been their aim, they state, to furnish the very best machines that could be made at prices fair both to their customers and themselves, and that they have consistently maintained their prices after establishing them. They further state that each season they have made every improvement in Columbias that the advancement in the art admitted of, but that at no time have they added greater value to their line than they are preparing for the coming year. It is pointed out that their position in the past has been one of protection and that under it they have permitted a flourishing competition to grow up; in many instances of fair and businesslike character.

The company believe that Columbia Bicycles at \$100 will have thousands of buyers who have before now been willing to take inferior machines for the sake of saving as much money as they were able to under the lower prices and cuts that have been freely made, but that, it is stated, cannot now be made in any such proportion.

It is too soon to state what effect this announcement will have upon the prices of high grade machines made by other manufacturers, but no doubt makers will be influenced in fixing prices by it. As was pointed out in the article on Bicycle prices in our issue of last week, the increased facilities for manufacturing and improved machinery have reduced the cost of manufacturing to such an extent that lower prices are made possible without too greatly affecting profits. This is particularly true with the larger concerns. Many Bicycle manufacturers have not yet fixed their prices nor the style of their machines for the coming year, and are therefore not in a position to make any an-

nouncement at present. Others believe, however, that it is essential to the interests of the entire trade that the price question be definitely settled at once, as they consider that the Bicycle business will be at a standstill until it is decided. We herewith give extracts from a number of letters received from manufacturers in response to inquiries as to the policy they would pursue regarding prices for 1895, and from which the Hardware trade may form an idea of the opinions of various Bicycle manufacturers regarding prices for the coming year. E. C. Stearns & Co., Syracuse, N. Y., write as follows:

We have concluded to list our standard machines during 1895 at \$100, but we shall make a special for use of racing men and scorchers which will list at \$125. We shall also put on the market a ladies' machine at \$100, a tandem and triplet.

Stover Bicycle Mfg. Company, Freeport, Ill., after stating that their standard list price will be \$100, refer to the situation as follows:

We shall continue to manufacture only the highest grade of wheels, and it is made possible this season to place upon the market the highest grade of wheels at \$100, on account of the advancement made in Bicycle manufacture, and also from the fact that a number of different parts of the wheel can be bought much cheaper by the manufacturer.

The League Bicycle Company, Hartford, Conn., who make a chainless wheel, remark as follows:

In regard to our own goods we will frankly say that we cannot afford to make them for less than \$125, and at the same time give the cyclists the benefit of the finest material and first-class workmanship. We consider it of the utmost importance to both rider and manufacturer that the price of \$125 be maintained for the season of 1895. Of importance to the manufacturer because, after allowing a fair profit to the agent as his discount, it leaves margin enough so that the manufacturer can, without running too great risks, employ the very best material and workmanship in the construction of his cycle, and at the same time have a fair margin of profit in its manufacture. As for our price on the output of 1895 we shall place the figure at \$125. We do this regardless of what other manufacturers may do, as every machine that the League Cycle Company turns out is a special Cycle entirely different from other lines.

The Hartford Cycle Company, Hartford, Conn., advise us that the Hartford safeties will be marketed by the Pope Mfg. Company during the coming year, and that they will be listed with their line.

Ames Mfg. Company, Chicopee, Mass., write that they will manufacture Bicycles known as the Ames, and then add:

We shall list our wheels at \$100, giving the regular trade discount. We shall at the same time continue to manufacture on order as in the past and shall use every effort to maintain our high standard of excellence in this direction.

The Sterling Cycle Works, Chicago, give the following as their prices for 1895:

Expert, Model E, \$100; Expert ladies', \$110; ladies' Diamond, \$110; Expert, Model I, \$125, and H, track racer, \$125.

Acme Mfg. Company, Reading, Pa., make the following statement regarding their Bicycles and prices:

We have fixed our list prices as follows: Stormer, Model A, \$65; Stormer, Model B, \$75; Stormer, Model C, \$85; Stormer, Model D, \$75; Stormer ladies' wheel, \$70. While our list seems to be astonishingly low we can say that our line will be first class in every respect and thoroughly guaranteed, and somewhat better than for 1894.

The Marion Cycle Company, Marion, Ind., state that their lists on Halladay-Temple scorchers for the year 1895 will be \$100 on all wheels over 21 pounds in weight, and \$125 on machines weighing 21 pounds and less.

A. F. Shapleigh Hardware Company, St. Louis, Mo., write as follows:

We shall continue to handle in '95 as we have in '94, the complete line of the Syracuse Cycle Company. Their lightest wheel will be listed at \$125, but they will also supply an elegant 24-pound wheel, which will be listed at \$100, as well as racing wheels and tandem, which are special. For a medium grade wheel we propose to handle the Crawford line. These goods will be listed from \$75 to \$40. We shall furnish these under our special name if desired.

Williamsport Bicycle & Mfg. Company, Williamsport, Pa., give us the following information regarding their prices:

Our prices for 1895 will remain the same, no matter who cuts. Our aim is to conduct a safe business with a reasonable profit to us and our agents. We turn out a strictly high grade wheel at a list price of \$85 for a plain wheel, a highly finished complete wheel with all accessories at a list price of \$100.

The Phillips Wheel Company, Rochester, N. Y., take the stand that lower prices mean unfair competition, and express themselves on the subject as follows:

We, as manufacturers of the highest grade of Bicycles, shall endeavor to keep our prices up to the present standard. A cut in prices means putting high grade machines in competition with the many poor wheels which now flood the market. Many people cannot tell the difference between a high and a low grade machine. The latter can be nickelized and enameled to look very fine indeed.

Other manufacturers consider that lower prices mean lower grade machines, an opinion which is fully brought out by the Queen City Cycle Company, Buffalo, N. Y., in the following remarks:

It is our firm conviction that the list price of Bicycles cannot be further reduced without a reduction in the quality. It is very true that there are many qualities of Bicycles placed upon the market at the present time at the same list price, but this is true in every business. What we refer to is the standard high grade Bicycle; we are therefore not in favor of any further reduction. We prefer to keep our quality thoroughly up to our high grade standard, and know that we cannot do this in justice to ourselves, our jobbers and our retail dealers without reducing quality.

The Central Cycle Company, Indianapolis, Ind., will list all Ben-Hur Bicycles next year at \$85. These, they state, will be high grade in every de-

tail, and will be sold at a reasonable discount in exclusive territory only.

Relay Mfg. Company, Reading, Pa., while of the opinion that last year's prices were not too high, will be influenced in fixing their prices by the action of the leading standard manufacturers.

W. H. Wilhelm & Co., Reading, Pa., will list their Reading racer, road racer, roadster and ladies' Wilhelm's at \$100, and their tandem at \$125.

McKee & Harrington, Lyndhurst, N. J., have made the prices on the Lyndhurst \$100, \$125 and \$135. They state that they have spared no cost in making their wheel first-class.

O. J. Faxon & Co., Boston, will list a standard Puritan machine for road use at \$100. They also intend to have a very light weight machine containing late improvements at \$110, and this last named grade of machine with a patent improvement of their own will be listed at \$125.

Bicycles for 1895.

Manufacturers, as a rule, have not definitely stated what machines their 1895 lines will include. We have information on the subject which a limited number of manufacturers have favored us with, and which we take pleasure in giving. The following list, however, will be supplemented from time to time.

Phoenix.—Stover Bicycle Mfg. Company, Freeport, Ill., advise us that they will continue to manufacture only the highest grade of wheels, and that they will place upon the market next season the Phoenix racer, standard Phoenix A and standard Phoenix A1; also two styles of ladies' wheels.

League Wheel.—The League Cycle Company, Hartford, Conn., who make a chainless machine, state that their 1895 wheels will be improved and will have all the up to date requirements of cyclists, such as narrow thread, high frame, light weight, &c.

Ames.—Ames Mfg. Company, Chicopee, Mass., have concluded this year to begin making Bicycles to be known as the Ames Company's wheel and to be called the Ames. The company propose putting three different models on the market—a roadster, a semi-racer or light roadster and a ladies' Bicycle. They state that it will be their endeavor to make these wheels strictly up to date in every respect.

Lu-mi-num.—The St. Louis Refrigerator & Wooden Gutter Company, St. Louis, Mo., will continue to manufacture their present line, with only minor changes in detail. To this they will add four new patterns. These will include a high frame and a medium frame men's machine weighing 19 and 19½ pounds; a ladies' machine at 22 pounds, and a racer at 16 pounds. All of these goods, the manufacturers state, will contain certain very valuable improvements, both in the aluminum and steel parts, which have been worked out during the last season and which have not yet been made public.

Sterling-Gales.—Schoverling, Daly & Gales, 302 Broadway, New York, will handle a line of wheels for 1895 consisting of the Sterling and the

Gales wheel, together with a line of cheaper juveniles, &c.

Ben-Hur.—The Central Cycle Mfg. Company, Indianapolis, Ind., advise us that all Ben-Hur Bicycles will be high grade in every detail, single frame, large tubing, having a 43½-inch wheel base, 5½-inch tread, and weighing from 20 to 24 pounds. The wheel, they remark, will be fitted with an unexcelled tire.

Bicycles and Hardware.

The following views from retail Hardwaremen regarding the advisability of handling Bicycles in connection with Hardware touch upon a subject which is pressing itself more forcibly upon the attention of retail Hardware dealers each year. A correspondent from Chicago introduces the subject by asking the question: Is the selling of Bicycles in the retail Hardware store feasible? and after answering it in the affirmative, remarks as follows:

We know this to be a fact because the experiment has been carried to a successful consummation, proving no less successful in the West than in the East, nor more productive of good results in the North than in the sunny South. A few years since a prominent San Francisco wholesale iron and steel merchant was induced to import a few wheels for his personal friends, without any idea of making a profit on the deal or of embarking in the Bicycle business. That little experience revealed to him the future possibilities of the Bicycle and he forthwith made application for and was granted agencies for several prominent makes of machines. So successful was the venture that a few years later witnessed the swallowing up of the wholesale iron, steel and Hardware business by its Bicycle department, and the local agency was given State representation, with one well-known line as a leader. In Pittsburgh, Pa., a prominent and highly successful retail Hardware merchant has come to be looked upon as one of the leading Bicycle dealers in the country. Like examples might be cited in Georgia, Texas, Minnesota, Wisconsin, Missouri, Illinois, and in fact almost every State in the Union.

A New York State retail dealer presents some excellent reasons why Bicycles and Bicycle sundries should become a part of a Hardware stock, among which are the following:

Bicycles have come to stay. They have become as much of an every day commodity as the Wheelbarrow or any other small vehicle in common use. They should become a part of the complete retail Hardware stock, especially so in the smaller towns, where there are no stores making Bicycles and sundries their exclusive business, and as they are most decidedly Hardware, being composed almost wholly of steel, they naturally come under this head. Bicycles and sundries afford a good profit, are very little trouble as to storage, preparation for sale and take up very little room on the floor. They are nice, clean goods to handle, and taken all together are very desirable, attractive goods for the retail Hardware merchant to handle. These goods should by all means be supplied to the riders by an established local business house and that a retail Hardware store.

The following experience of an Ohio firm with the introduction of Bicycles into their Hardware store could, no doubt, be duplicated by many other merchants in various parts of the

country. This recital will prove equally interesting to those who have already made a success of this branch of their business as to those who are contemplating the taking up of Bicycles during the coming season. The firm writes as follows:

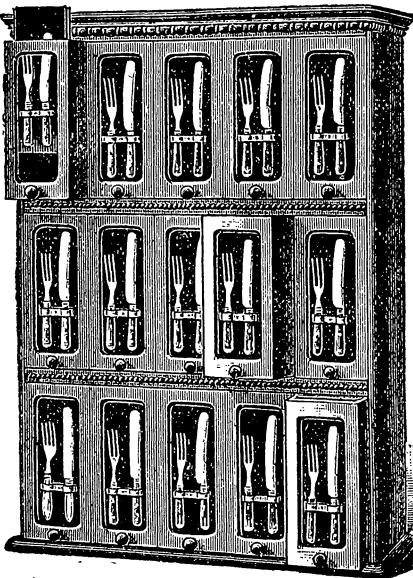
When Bicycles were first brought to our notice by a traveling man, who urged us to add them to our stock of Hardware and Stoves, we told him it would be utterly impossible to handle them as we knew nothing about them, and further, we had so much to do we could not give a new line of goods our attention; and above all, we knew of no one in our town whom we thought would buy.

He left us saying: "It will be only a matter of time when you will put them in and think as much of being out of Bicycles as out of Nails." This we have since found to be true. He came again, and after examining his line as best we could, obtaining his prices, terms, &c., we gave him a sample order for three wheels: One high grade, one medium and one combination. These were shipped at once, and every one was anxious to see them; every one, old and young, in our town talked and wanted a Bicycle.

The result was an excellent trade and without much extra labor.

The Warren Cutlery Cabinet.

THE ACCOMPANYING CUT represents a Cutlery Cabinet which the J. D. Warren Mfg. Company, Burlington, Iowa, have recently added to their line of Shelving. The Cabinet



The Warren Cutlery Cabinet.

is described as being made of antique oak, polished, 40 inches high, 27 inches wide and 13 inches deep, containing three tiers of boxes, with five boxes in each tier. The boxes are 12 inches high, 5 inches wide and 12 inches deep, each box being designed to hold one-half gross of Table Knives and Forks. The boxes are furnished with Warren's patent glass front, so constructed that the sample Knife and Fork are attached to a false back, finished in silk plush, and which slides into a groove back of the glass front. The point is made that this arrangement keeps all moisture and dust from the sample, at the same time enriching its appearance. The three different kinds of the same style or pattern, cocoa, ebony and bone, can be carried back of one sample in the same box.

The Cary Building.

THE CARY BUILDING, 105-107 Chambers street, extending through the square to 89-91 Reade street, New York, has been extensively renovated and remodeled. This edifice, long occupied by a number of prominent Hardware concerns of this and other cities, will doubtless now attract many others. A very commodious central entrance with staircase and passenger elevator has been built in, giving easy access to the lofts above. This entrance on Chambers street is 12 feet wide and faced with white enameled brick, trimmed with light hardwood and Bower-Barff Hardware. The floor is tiled with hexagonal blocks 3 inches in diameter. On each side are marble directories showing the occupants of the several floors. Among the well-known firms now in this building are the Union Nut & Bolt Company, Dunham, Carrigan & Hayden Company, New York and San Francisco; Henry B. Newhall Company, representing 11 manufacturing concerns; Burger & Baumgard, and H. C. Marshall, syndicate buyer. The Union Nut & Bolt Company still have the ground floor and two basements, the latter being used for stock and shipping rooms. On the ground floor they have rented office accommodations to a number of Hardwaremen and others, among whom are George N. Pierce & Co., Buffalo, N. Y., Paddock & Kleine, Central Expanded Metal Company, Acme Nail Works, Harris Toy Company, E. J. Kelly, W. B. Sargent and Christie Romaine. We are told \$40,000 has been spent on the improvements now about completed.

John Chatillon & Sons' Catalogue.

JOHN CHATILLON & SONS, 85-93 Cliff street, New York, have just issued a new catalogue of their extensive line of Scales and Butchers' Goods. It is bound in stiff boards, cloth covered, and has 248 pages, each 9 x 6 inches. Pages 13 to 160 contain articles of their own manufacture, while the balance represents the Butchers' Goods of Foster Bros., Fulton, N. Y., and Frederick Dick, Esslingen, Germany, for whom this concern are sole agents, together with a large assortment of analogous wares of other producers, such as Meat Hooks, Coffee and Spice Mills, Butchers' Saws, Meat Cutters, &c. Many new sizes of Scales have been added, and on pages 102 and 103 are shown 21 kinds of Circular Spring Balances with glass sash and white dials, whose pointers make but one revolution instead of three to record the full capacity. These are preferred by many who fear errors where more than one revolution is made. The Warehouse Balance on pages 104 and 105 is now made in 24 sizes where formerly but eight were furnished, while pages 112 to 119, inclusive, show a total of 42 styles and kinds of their new Favorite Family Scale. One of their new Scales is the Even Balance Market Counter Scale, on page 122, which is provided with agate bearings and has obverse and reverse dial and marble slab. Another feature is the Spring Balance Frame on page 128, to stand on the counter. Hanging Balances with round dial, hook and pan, with capacities up to 60 pounds, are suspended from the center. The frame is of arched brass tubing, nickelized, supported by two circular bottoms or standards. This is suitable for especially fine stores.

Grand Rapids Hand Screw Company.

THE GRAND RAPIDS HAND SCREW COMPANY of Grand Rapids, Mich., in their advertisement in this issue call the attention of the trade to a Youths' Cabinet Bench for holiday trade. The Bench is similar to a regular cabinet maker's Bench and is designed for the use of boys mechanically inclined. These goods, we are advised, were put on the market too late last fall to be very thoroughly distributed for the holiday trade; but that dealers who handled them were pleased with the results.

Trade Items.

THE STANDARD TOOL COMPANY, Cleveland, Ohio, have added to their line of goods Spring Colters and Flat Spring Keys. The Colters, we are advised, are made by special machinery, highly finished and well pointed and shaped. The Flat Spring Keys are referred to as being uniform in size and jointed, and are made of any length and width desired.

THE INDIANA WIRE FENCE COMPANY of Crawfordsville, Ind., favor us with a copy of the souvenir edition of the Crawfordsville Journal, in which the manufacturing and commercial enterprises of that thriving city are very handsomely written up. The plant of the Indiana Wire Fence Company is illustrated and makes a fine showing. The works are extensive, covering almost 2 acres, and are well worthy of the appreciative description which appears in connection. C. M. Crawford is president and O. M. Gregg is secretary and treasurer.

JOHN P. LOVELL ARMS COMPANY, Boston, Mass., have received the first and the highest award, gold medal and diploma, at the California Midwinter International Exposition, for Lovell Diamond Cycles. The company send a *fac-simile* of the official ribbon. The exhibit of the Lovell Cycles was made by Smith's Cash Store, coast agents, 414-418 Front street, San Francisco.

SMITH BROS. HARDWARE COMPANY, Columbus, Ohio, in their advertisement in this issue call attention to the Screw and Bolt Cases which they are putting on the market. They state that their Screw Case holds 89 gross and the Bolt Case 55 sizes. They also make a Combination Case that holds 53 gross of Screws and 28 packages of Bolts.

A NEW ENTERPRISE entitled the Philadelphia Machine Screw Works has been established by C. Sternberg and W. C. Huston at 624 Race street, Philadelphia, for the purpose of manufacturing all kinds of Machine Screws and Studs and experimental and light jobbing specialties. W. C. Huston, formerly in charge of Franklin S. Miles Screw Works for many years, will have charge of the manufacturing department. The entire outfit of machinery for the plant was furnished by the Garvin Machine Company of Philadelphia and comprises all the latest designs for the rapid and accurate production of Machine Screws, thus putting the new company in a position to fill all orders entrusted to them promptly and satisfactorily.

FRED. STELLWAGEN, New York manager of Reading Hardware Company, recently entertained a number of the

company's officials at the Hardware Club. Being in the city on a business trip, they expressed a desire to inspect the apartments, which was accomplished after dining together in one of the small private rooms. Those present, who are really the Board of Managers, were: M. Harbster, president; John E. Harbster, superintendent; G. N. Jacobi, sales manager; T. B. Hendrickson, Philadelphia manager; G. B. Stevens, J. B. Fricker, I. G. Trait.

THE HERBRAND COMPANY, Fremont, Ohio, manufacturers of Razors and Strops, have added to their already large line eight styles of Razors with engraved aluminum handles. This metal, we are told, is alloyed with nickel to give it the requisite stiffness.

IN A STRIKING ADVERTISEMENT on another page the Trixy Hair Curler Company, Cincinnati, Ohio, call the attention of the trade to their Trixy Hair Curler, some of the points in connection with the use of which are mentioned.

ANNOUNCEMENT is made by Iver Johnson that the business heretofore conducted by him at Fitchburg, Mass., under the style of Iver Johnson & Co., will, on and after November 1, be carried on under the name of the Iver Johnson Arms & Cycle Works. The management will continue as before.

CARTER & CO., Scranton, Pa., are manufacturers of all kinds of Chopping Axes, Axe Eye Splitting Mauls, Anthracite Mining Tools, &c. In their advertisement in this issue they illustrate their Black Diamond finish Michigan Pattern Axe, and invite the trade to send for their catalogue.

THE GOSHEN SWEEPER COMPANY, Grand Rapids, Mich., are getting out Sweepers in special Christmas finishes. These the company refer to as being figured birch in the newest furniture finish; antique mahogany; specially selected bird's eye maple and curly maple in shades of cinnamon brown, olive and English ivy.

AN ADVERTISEMENT on another page illustrates the Christmas Tree Holder which is being put on the market by the Logan & Strobridge Iron Company, New Brighton, Pa. This Holder will fit any size of tree. Attention is called to its fine appearance and the low price at which it is offered.

Price-Lists, Circulars, &c.

W. & B. DOUGLAS, Middletown, Conn.: Pumps. The company issue special catalogues relating to their various lines, as follows: Pneumatic Bicycle and Sulky Pumps, Electric and Power Pumps, Spraying Pumps, Wind Mill Pumps, and a catalogue devoted to Water Works and Hydrants. The manufacturers find that classifying their catalogues into specialties is more beneficial than to bind them in one book, as it conveniently arranges the various lines of Pumps for specialists.

THE CLARK HARDWARE COMPANY, Atlanta, Ga.: Guns, Revolvers, Hunting Clothing, &c. An illustrated catalogue and price-list shows Guns, Rifles, Sights, Revolvers, Gun Implements, Gun Covers, Hunting Clothing, Sport in Goods, &c.

JOHN P. LOVELL ARMS COMPANY, Boston, Mass.: Bean's Perfection Feed Bag. An illustrated circular describes the Bag, which consists of two bags, one bag inside the other, with a space between for oats. The lower part of the bag is made of galvanized iron, with a breathing screen which comes in front of the animal's nose.

It Is Reported—

California.

That J. L. Viereck, Hardware merchant, at LOS ANGELES, has been succeeded by E. L. Viereck.

Connecticut.

That L. L. Ensworth's store, at HARTFORD, was visited by fire on the 28th ult. The damage is estimated at \$10,000.

Colorado.

That C. J. Carmody is about to enter the Hardware business, at FLORENCE. He has just completed a new building.

Georgia.

That W. O. Peacock has opened a new Hardware store at COCKRAN.

Illinois.

That Carlson & Rehnstrom, ANDOVER, will soon retire from the Hardware business.

That William McNeill & Co.'s new brick store, at PROPHETSTOWN, is rapidly approaching completion.

That the S. E. Haggard Company have been organized at BLOOMINGTON. They will deal in agricultural implements. The capital stock is \$10,000. The incorporators are S. E. Haggard, D. D. Haggard and Colvin Rayburn.

Indiana.

That Freiberger & Sulzer's Hardware store, at FORT WAYNE, was recently wrecked by a powder explosion, the entire front having been blown out. Loss, \$2000; fully insured.

Iowa.

That John Swigart has bought a one-half interest in the Hardware business of A. D. Williams, at WYOMING, to take effect November 1.

That Smith & Erickson, PATON, have taken possession of their new Hardware building.

That Frank D. Smith has purchased the John E. Evans stock of Hardware, at HAMPDEN.

That Mr. Jewell of BRUSH CREEK has decided to open a new Hardware store at STRAWBERRY POINT.

That W. C. Timmons of IDANA, KAN., will, about November 15, open up a new Hardware stock at WESTCOTT.

That Elder & Nicho, Hardware, Stoves, &c., TINGLEY, have sold out.

Kentucky.

That Lockridge & Wilson, in the Hardware business at MAYFIELD, have been succeeded by W. A. Lockridge.

Maine.

That E. B. Harvey, CARMEL, has sold his Tin and Stove business to D. D. Roberts and has removed to NEWPORT.

That Geo. A. Dustin, Hardware dealer, AUGUSTA, will remove his business to a new location on December 1.

Massachusetts.

That the Hardware dealers of FALL RIVER have agreed to close their stores four nights in the week.

Michigan.

That the Hardware store of the Edwards & Chamberlin Company, KALAMAZOO, was burglarized on the 17th ult.

Minnesota.

That J. Kraker has sold his Hardware store, at MELROSE, to W. Wardian & Dieterick of ST. MARTIN. Mr. Wardian was formerly a partner in the firm of F. X. Wenk & Co. of ST. MARTIN.

That R. C. Warner of MINNEAPOLIS has bought out M. F. Magnuson's Hardware store, at EDEN VALLEY.

That W. C. Holmes has opened up a new Hardware store at AUSTIN.

That Thomas Dahle, recently of BROWNSDALE, has purchased an interest in the Hardware store of W. C. Holmes, AUSTIN.

That the Meacham Hardware Com-

pany have recently been formed at RED WING. The company will continue the business formerly conducted under the style of Meacham Bros.

That Henry Seide of MILBANK, S. D., has removed to WOOD LAKE, where he has purchased a lumber and Hardware business, in which he will engage.

Montana.

Murphy, Maclay & Co., GREAT FALLS, are enlarging their establishment for the purpose of carrying a larger and more complete line of Hardware.

Nebraska.

That Ogilvie & Robertson are successors of Cusack & Ogilvie, Implement merchants, NORTH BEND.

New York.

That James Gray has opened a new Stove store at GREENBUSH.

That the Hardware store of Walton Stark & Co., SARANAC LAKE, was slightly damaged by fire on the 8th ult.

That McLaury Bros. have bought out Frank Aplin's Hardware store, at PORTLANDVILLE.

That C. W. Bowtell's Hardware store at FORT EDWARD, was entered by thieves on the 24th ult., who secured a quantity of Revolvers, Razors, &c.

North Dakota.

That F. O. Brewster, Implement dealer at LEAL, has gone out of business.

Ohio.

That the Hardware store of Sloniker & Smith, ALGER, was entered by thieves a short time since and robbed of a quantity of Knives, Revolvers, Tools, &c.

That the Hardware store of Paul Bros., BOTKINS, was burglarized on October 16. Fifty dollars' worth of Knives and Revolvers were taken.

Oregon.

That the Hardware stores of Gray Bros. and Brown & Smith, SALEM, were robbed on October 18. In both instances the burglars effected entrance through the rear of the store room.

Pennsylvania.

That S. C. Coons is contemplating the erection of a new Hardware store at CLARK'S GREEN.

That the SCOTTDALE Hardware store of Null & Bryan was burglarized on the 22d ult. In gaining an entrance to the store the thieves broke a large plate glass window.

That Brillinger & Emig and Wm. Felty & Son have opened new stores at YORK.

That Taylor & Spaulding, TOWANDA, have dissolved partnership.

That Hosterman & Stover are successors of James C. Smith in the Hardware business at MILLHEIM.

Tennessee.

That a large fire at NASHVILLE destroyed the Hardware stores of Dudley & Black and C. H. Hitchcock & Son. Their loss is estimated at \$50,000.

Texas.

That W. J. Taylor, Hardware merchant, COMMERCE, has sold out to Taylor & Sedberry.

That Smyth & Hoyle, Hardware dealers, ALVARADO, have been succeeded by Chapman & Sanson.

Wisconsin.

That the Crary Hardware & Stove Company, ELKHORN, have just completed some improvements to their store. They have greatly enlarged their stock of Stoves and have also added a full line of glaziers' supplies.

That A. E. Bourne's Hardware store, at PLOVER, was entered by burglars on the 22d ult., and \$65 in cash and checks, besides Revolvers, Razors and Knives, taken.

That Joseph Massey of GREEN BAY has decided to build a Hardware store at CUDAHY.

That fire on the 25th ult. destroyed the Hardware store of Thomas Hicks, at LINDEN. Loss, \$5000; insurance, \$2000.

The Hardware trade throughout the country are requested to report business changes, improvements and other matters of trade interest suitable for mention in this department.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

White Lead.—There has been no change for the better in market conditions. Orders come in slowly and it is the rule that grinders and distributors generally are buying cautiously. To some extent this may be attributed to lively home competition, particularly in Western markets, more or less reflection of which appears in this locality. There is enough foreign competition to make matters interesting, however, and give cash buyers of round lots more or less decided advantage. Domestic brands of Dry White Lead may be secured easily at 4½¢ and there is more than a possible chance of deals in round lots being put through at 1½¢ @ ¼¢ less, since foreign makes are indirectly offered at 4½¢ in lots of 50 tons. Lead in Oil is quite as irregular and uncertain. Domestic product goes at 5¢ @ 5¼¢ in a wholesale way, according to quantity, and foreign brands are nearly or quite as low. Besides the foreign competition there is that of domestic quick process and mixed Leads, that serves to aggravate the unfavorable situation.

Rumor has it that the combine of American producers will shortly issue a new list of prices low enough to meet any and all competition. Very little satisfaction is given on this point and signs are not wanting that there is either a whistling to keep up courage or an indirect attempt to conceal the true situation of the market.

Red Lead.—The conditions in the market for this article are not as greatly strained as those of the market for the leading pigments, but a weakish tone prevails and both domestic and foreign product may be secured in round lots at prices below those openly quoted. Foreign could probably be bought in round lots at 5½¢ @ 5¾¢, or quite as cheaply as best domestic.

Litharge.—Purchases of low grades by large consumers have been somewhat more extensive, chiefly for delivery during the balance of the year, but sharp foreign competition has held prices down to a very low level. Foreign went at 4¢ @ 4½¢ and the common grades of domestic quite as cheaply, while anything above 5¾¢ net has been the exception on high grades.

Orange Mineral.—There is lively competition between sellers of foreign brands for future shipment, and the market is at present in an unsettled condition. Large buyers could doubtless secure good German brands at 6½¢ @ 6½¢, French at 8½¢ and English at 6½¢ @ 6½¢. The offering of domestic is comparatively light, but lowest quotations on reliable foreign stock are being met.

Zincs.—Some improvement has taken place in orders for domestic Oxide, but bids on round lots were invariably low, and nothing more than routine business has taken place. Upon the whole, the market shows rather weak tone. No further change has been made in prices of foreign brands, but

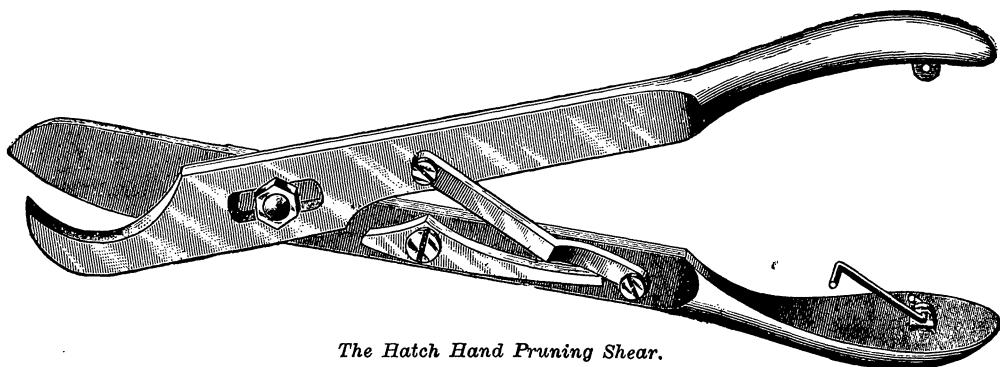
late revision of list rates has failed to stimulate business, and the market remains in poor form.

Colors, &c.—The distribution of Dry and Oil Colors is somewhat dis-

The Hatch Hand Pruning Shear.

John A. Knecht & Co., Cincinnati, Ohio, are introducing a pruning shear, as shown in the accompanying cut.

eners, Fig. 1, are made in all the letters of the alphabet in rounds and squares with $\frac{1}{2}$ -inch shanks, of which the cuts are full size. The Federal fasteners, Fig. 2, are oval in four sizes, with



The Hatch Hand Pruning Shear.

appointing. There is similar experience with ready mixed Paints. Competition is keen nearly all along the line, and prices are unsettled, with little encouragement for any immediate turn for the better.

Oils and Turpentine.

Linseed Oil.—No further change in prices has taken place, although a considerable reaction in the cost of domestic raw material is on record. Ordinarily a sharp decline in the price of Seed leads to cheaper Oil, but crushers are so well in harmony that there is no really vigorous competition or cutting of prices at the moment. The figures seem to be kept quite as high as they can be without inviting live foreign competition.

Cotton Seed Oil.—Remarkably low prices accepted by grinders have led

The shear is described as being all solid, forged from razor steel; with a positive shear cut, which will clip anything that can be taken between the jaws, easily and with the slightest pressure. The shear is especially adapted to small pruning, and every pair is fully warranted by the manufacturers.

Improved Joiners' Clamp.

The Cincinnati Tool Company, Cincinnati, Ohio, are putting on the market a joiners' clamp, herewith shown. The clamp is made entirely of malleable iron and steel, the bar being of steel $1\frac{1}{8} \times \frac{3}{16}$ inch in size. The hand wheel is 3 inches in diameter and is connected with $\frac{1}{2}$ inch wrought screw. The manufacturers claim that the clamp is light,



Improved Joiners' Clamp.

to a large business. Compound lard manufacturers have placed orders for the equivalent of about 30,000 barrels, crude, to be shipped in tank cars direct from producing sections, and a number of sales of both crude and refined, in barrels, have also been made. Crude went at 18¢ @ 19¢, f.o.b. mill, for bulk and at corresponding prices in barrels delivered here, or, say, the basis of 24¢ @ 25¢ for prime. Refined has been selling at prices on the basis of about 30¢ for prime Summer Yellow. The market at the close was in a very unsettled condition, with prices irregular and weak.

Lard Oil.—Prices have receded to 60¢ and under for prime city brands and some business has been done in Western at as low as 58¢. The decline is attributed to lower cost of raw material and sharper competition among sellers. Low grades, of which the offering is freer than usual, have been sold at relatively lower prices, or on the basis of about 40¢ for No. 1, ex-store.

Fish Oils.—Dealings in crude Sperm, Whale and Menhaden Oils have been on a very moderate scale and the market is quite bare of new feature. In manufactured products a fair business has passed, chiefly at about the prices that have ruled for a month or more.

Spirits Turpentine.—An advance in prices to the extent of nearly 1¢ a gallon has taken place. This was due chiefly to higher rates at producing points, where business has been quite lively during the week. In the New York market the dealings have been only fair, with the latest at 28½¢ @ 29¢, as to style of package.

shanks from $\frac{5}{16}$ to 1 inch in length. These two styles of fasteners are designed for binding or fastening papers or other material together. Like fasteners for the same purpose are made in Columbian, Colonial, Continental and Fleur de lis designs and in a variety of sizes. Two designs of decorative fasteners are



Fig. 3.—Decorative Fasteners.

shown by full sized cuts in Fig. 3, these being designed for decorative binding, making paper and leather frames, lamp shades, &c., and are also furnished in sterling silver and aluminum. The Security fastener, Fig. 4, has a tubular shank, which adjusts itself to the bulk of the material bound and securely



Fig. 4.—Security Fastener.

binds the material between the corresponding heads by pressing the heads toward each other. The shank shown is designed to effect a permanent binding. Another form of shank is made with the same kind of heads, but is split, permitting the fastener to be removed from the material bound without defacing it.

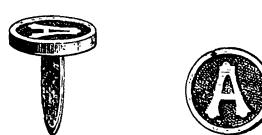


Fig. 1.—Initial Fasteners.

on the market by Holmes, Booth & Haydens, 37 Park place, New York. The concern have made goods of like character before, but they have recently put upon the market a line of entirely

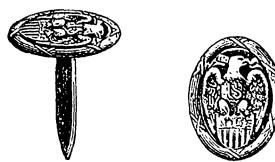


Fig. 2.—Federal Fasteners.

new patterns and of a much greater variety than was previously manufactured by them. The fasteners are referred to as being made of first quality jewelers' metal and finish and as having solid embossed heads. The initial fast-

The big bronze statue of William Penn that has been standing for the past two years in the courtyard of the public buildings, at Philadelphia, awaiting transfer to its lofty perch on the summit of the City Hall tower, has been taken to pieces and hoisted to the top of the dome, where the work of assembling and fixing it in place will be carried out at once. The statue will stand 542 feet above the ground.

A correspondent of a South African newspaper ascribes the reason for the preference shown in that country for American mining machinery "not to any particular superiority of the American machinery, but simply to the circumstance that American firms send skilled men to erect the plants they sell, while English makers do not take that trouble."

The Monarch Frame Pulley.

The illustrations herewith given are of the Monarch frame pulley offered by

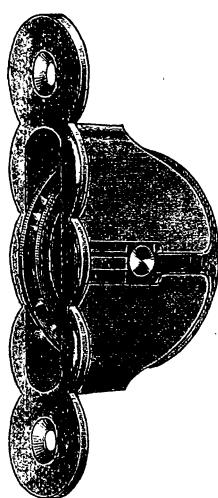


Fig. 1.—Monarch Frame Pulley for Auger Mortise.

the Palmer Hardware Mfg. Company, Troy, N. Y., and are made in the styles

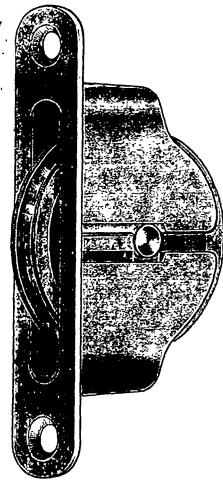


Fig. 2—Monarch Frame Pulley, Round End.

shown in Figs. 1, 2 and 3. The case is cast in one piece, with slots in its sides,

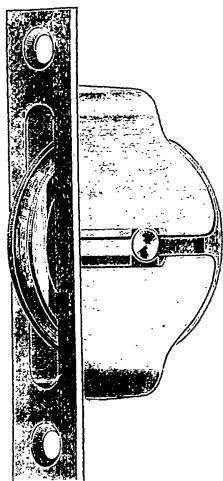


Fig. 3.—Monarch Frame Pulley, Square Face.

the bottoms of which form pin seats, always located, it is explained, in the same relative position. Ribs extend

down the case on each side of each slot, across which at the proper point a groove is cut, into which a steel pin is secured and on which the pulley revolves. The manufacturers state that the wheel has a full bearing cast, not drilled, and that every one is perfectly straight and exactly in the center, making its operation as accurate as if machine turned. It is remarked that the pulleys are made by a new process that insures accuracy and cheapness by means of new and original machines and appliances.

Woodite Ware.

The Bronson Supply Company, 72 Beekman street, New York, as agents for F. W. Morse, Providence, R. I., have just commenced to introduce a new enameled ware called Woodite. The name is derived from the close resemblance in finish to the grain and color of wood. The enamel itself is mineral in character and not a lacquer or japan. The process requires several coatings, yet the covering of enamel is very thin. The ware, it is explained, is extremely tough and elastic, does not

ordinary work, but correct angles can be laid out with the tool on any part of the square if two of the three bearing points are kept in contact. It is further explained that when the protractor is set at any angle, the angles of the two square tongues form a miter; as, for

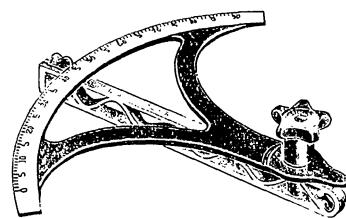
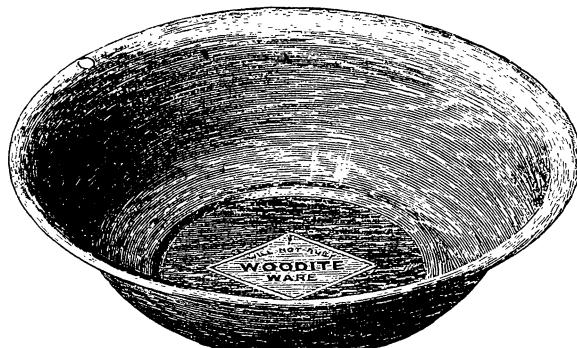


Fig. 1.—Protractor Miter.

instance, if the arm is set at an angle of 30°, or one-third miter, to one tongue of the square, it will form an angle of 60°, or two-thirds miter, at the other tongue of the square. This feature will be found useful in cutting in rafters, &c. By using the second catch 180 divisions of a quarter circle, or 720 divisions of a full circle, can be made. The tool is



Woodite Wash Basin.

crack or chip from indentation and will not rust. It is not intended to withstand heat. The ware will be offered in the near future in a large variety of articles for household and kitchen use. Something like 18 months, we are told, have been spent in testing and experimenting, until the manufacturers believe it has been perfected. At present basins only, similar to those illustrated, are offered to the trade, but other lines will be ready later. The basins are made of IX tin and then enameled a black walnut color, although it is possible to produce various colors imitating different woods.

Protractor Miter.

Sawyer Tool Company, Athol, Mass., for whom Peoli & Willey, 97 Chambers street, New York, are selling agents for domestic and export trade, are introducing a protractor miter for use in combination with a steel square, as herewith shown. The device consists of a frame with a circular edge accurately graduated in degrees, by notches, and a swinging arm pivoted at a point central to the graduations. At the end of the arm are two latches that snap into the graduations on the circle and determine the angle or miter, it is stated, positively. At the opposite end of the protractor the parts are rabbed to form bearings by which, in connection with the pivotal stud, the tool may be located on any part of the square, as shown in Fig. 2. It is preferable to use the protractor at the center of the square for

finished in japan and nickel plate and is designed for use by carpenters, pattern makers, cabinet makers and in wood working establishments, for laying out different pitches, cutting in rafters, getting out house finish, making correct patterns for duplicate work, projecting and taking off angles from drawings and for laying out winding stairs, &c. The manufacturers claim that the tool can be attached rigidly to

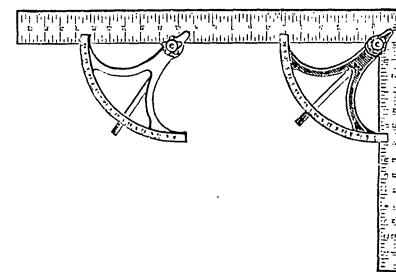


Fig. 2.—Protractor Miter Attached to a Square.

a square in an instant and as quickly detached; that the settings are positive; that it is light, strong, simple and durable, and that it is warranted accurate. Useful tables accompany each tool.

The *Canadian Trade Review* says that the duty of 30 per cent. on bicycles is proving effective in establishing the bicycle manufacturing industry in the Dominion. Most of the existing factories are enlarging, and new concerns are about to build.

The Bernard Folding Dividers.

The accompanying illustrations represent folding dividers put on the market by the William Schollhorn Company, New Haven, Conn., for whom Julius Berbecker & Co., 280 Broadway, New York, are agents.

made in 4, 4½ and 5 inch sizes and is packed half a dozen in a box and a gross in a case.

The Lansing Runner.

The illustration here given represents a runner being introduced by the Lansing Wheelbarrow Company, Lans-

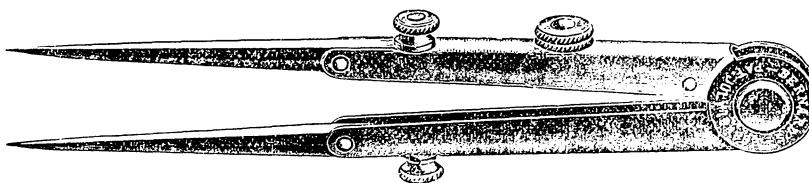


Fig. 1.—The Bernard Folding Dividers.

The points of the dividers are made of crucible steel, finely tempered, and arranged for fine adjustment. The smaller thumb screws are for holding the points open, while one of the screws is connected with a spring which allows the point to be moved for fine adjustment. The larger thumb screw

ing, Mich. The runner is described as consisting of a knee and hub formed of one piece of malleable iron, devoid of clips and braces, together with a wood rave and steel shoe, constructed, it is stated, in such a manner that it is impossible to get rickety or out of shape. The lower end of the knee has flanges

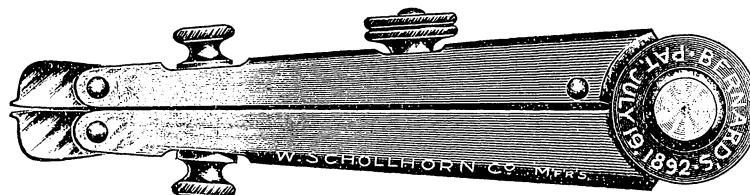


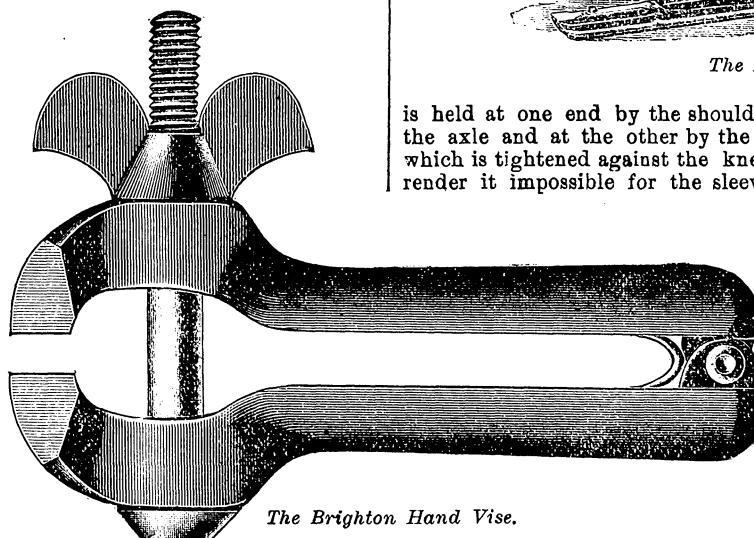
Fig. 2.—The Bernard Dividers Folded.

is for fastening the dividers open at any point desired. The dividers are made in an 8-inch size, and measure 5½ inches when folded as in Fig. 2. The tool is full nickel plated, and the manufacturers claim is strong and durable, and that it can be carried in the pocket as safely and conveniently as a pocket rule.

The Brighton Hand Vise.

The accompanying cut represents a hand vise being introduced by Logan & Strobridge Iron Company, New Brighton, Pa. The tool is referred to by the manufacturers as being hand

which pass over both sides of the runner, to which it is securely bolted. The hub is hollow and contains a wooden sleeve bored to fit the axle. The sleeve



The Brighton Hand Vise.

some in design, strong and convenient to handle. The point is made that the price places the vise within reach of the humblest hand vise user. The tool is

become loose. The rave is fastened to the knee by four bolts and is strengthened by a steel sheet under the rave, through which the bolts pass. The

runner is usually finished in wine color and striped with gold. It is explained that the paint is well rubbed down and nicely varnished; that the finish is one of the points of excellence claimed for the runner, and that the runners are suitable to use on fine carriages. Two sets of sleeves are furnished with each set of runners, so that the same set of runners may be used on two sizes of axles. The runners are furnished with a difference of 2 inches in height between the rear and the forward ones, so that

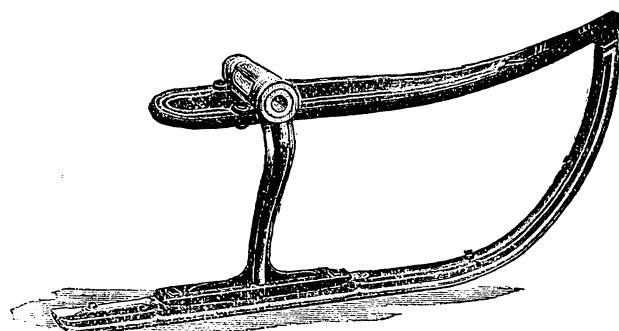


The Bommer Compound Spiral Spring.

the body of a carriage or wagon on which the runners are used will be nearly level. The runners are made in three sizes, to be used on axles from 4 to 1½ inches, with a capacity of from 1000 to 3000 pounds.

Bommer's Compound Spiral Spring Hinges.

In the illustrated description of Bommer's compound spiral spring hinges, manufactured by Bommer Brothers, Brooklyn, N. Y., which appeared



The Lansing Runner.

is held at one end by the shoulder of the axle and at the other by the nut, which is tightened against the knee to render it impossible for the sleeve to

in our issue of October 25, 1894, not enough prominence was given to the fact that one of the cuts shown at that time, and which we reproduce herewith, was intended to represent a section of but about one quarter of the entire length of the springs, and not the whole spring. The manufacturers, in this connection, emphasize the point that the springs, besides being compounded, are actually longer in a given size of hinge than in other hinges of this class, or, in other words, that each individual spring of the compound springs is longer than those in similar hinges. It is further explained that where double compound springs are used over twice the length of spring is obtained; that where triple compound springs are used over three times the length is obtained, and that where quadruple compound springs are used four times the length of spring is obtained in comparison with similar goods.

Herrick's Hammer and Hatchet Case.

F. A. Herrick & Co., Jackson, Mich., are offering a case for retail stock of hammers and hatchets as hers shown. The case is made of oak, well finished, the brackets on which the goods hang are of malleable iron, japanned, and the legs or standards are of japanned cast iron. The back of the case has a drop door hung with spring hinges so that

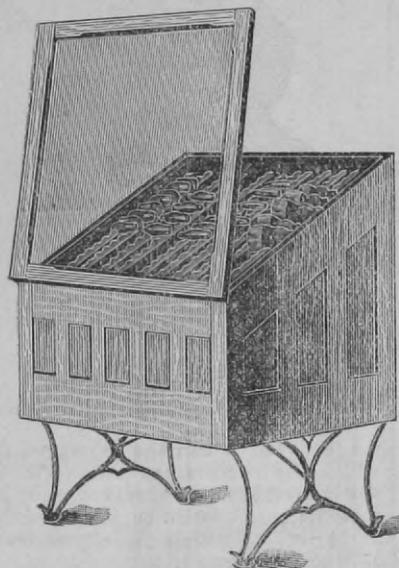
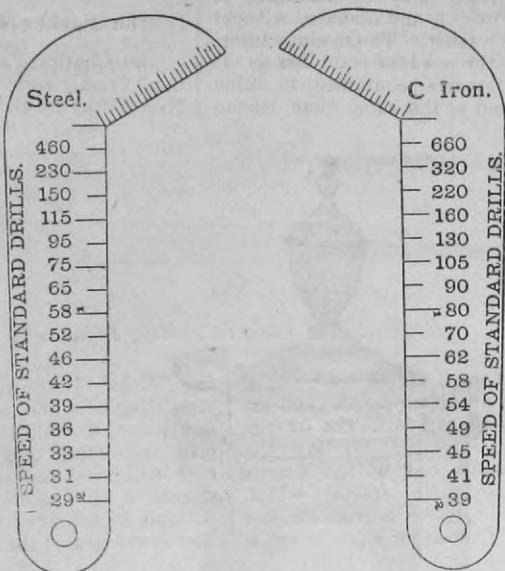


Fig. 1.—Herrick's Hammer and Hatchet Case.

the lower part can be used for keeping surplus stock, while the glass cover over the top has a supporter to hold it up when goods are being shown. The case is finished on the back in the same style as on the front, so that it may be used in any position or in any part of

for the case that it is attractive in appearance, that every article in the case is seen at a glance, that the goods are kept free from rust, and that articles

toward the operator. The straight edge of the gauge has a 2-inch scale graduated by eighths of an inch; opposite each eighth mark is a number,



Twist Drill Grinding Gauge and Chart.

are removed by the salesmen only, as the glass cover is hinged at the front and lifts up from the back, so that the customer handles only such articles as are shown him.

Twist Drill Grinding Gauge and Chart.

The accompanying cut represents a gauge and speed chart for twist drills, put on the market by the Standard Tool Company, Cleveland, Ohio. The gauge is made of steel $\frac{1}{16}$ inch thick,

which indicates, it is explained, the best speed at which to run a drill of corresponding size or diameter. One side of the gauge is marked for boring steel and the other side for boring cast iron. The manufacturers remark that grinding twist drills accurately is generally admitted to be a difficult operation, and that the proper speed or number of revolutions at which a drill should be run is of great importance in getting the best and most economical results from the use of twist drills; also that by using the gauge an operator will be enabled to grind twist drills accurately, thereby making a considerable saving.

The Western Combination Washer.

Horton Mfg. Company, Fort Wayne, Ind., are offering a washing machine, as herewith illustrated. The corrugated wood roller, which is shown in the cut as being swung on the top of the machine, is described as revolving on its

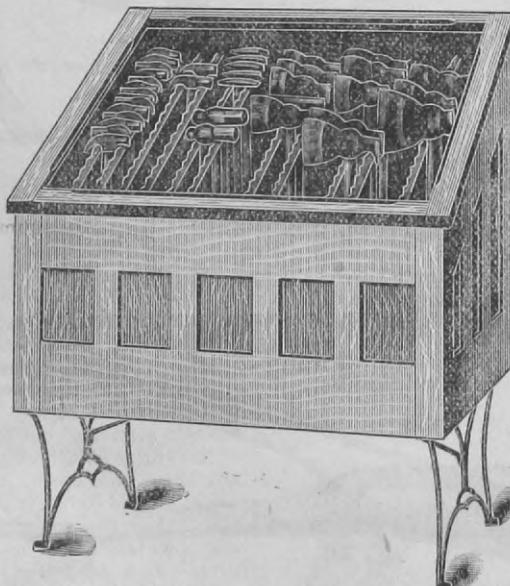
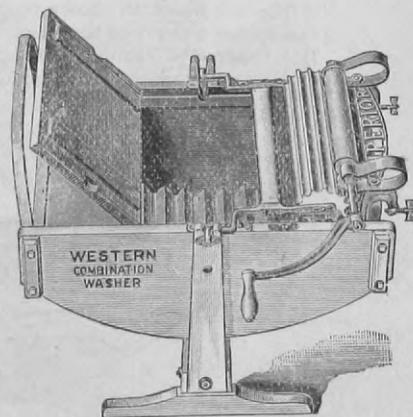


Fig. 2.—Hammer and Hatchet Case Closed.

the store desired. The cases are fitted up in three sizes, as follows: No. 1, to hold 66 hammers of various kinds and sizes, and 54 hatchets and hand axes of various kinds and sizes; No. 2, to hold 164 hammers only of various kinds and sizes, and No. 3, to hold 90 hatchets and hand axes of various kinds and sizes. The manufacturers claim

and the angle of the gauge is ground to exactly 59° , which, it is stated, is the proper angle for the cutting edges of a twist drill. The angle on the gauge is graduated so that the cutting edges of the drill may be measured and ground exactly the same length. The clearance of the drill is determined by holding the drill on the gauge and revolving it



The Western Combination Washer.

center when in use, and at the same time as swinging back and forth in a direction opposite to the motion of the box; also as adjusting itself vertically to any quantity of clothes in the washer. The point is made that this arrange-

ment avoids the use of a pin wheel, which retards the motion of the water and of the clothes so necessary to quick work. It is explained that by a simple contrivance the machine is locked so that a wringer may be attached, as shown in the cut, and operated without tilting the washer. The manufacturers claim that the machine combines all the desirable features contained in other washers, and at the same time lessens

ance and, the manufacturers claim, will not turn smoky like nickel. These goods are put up in dozen lots on cardboard signs which are designed for display on counters or in windows.

The Parker Portable Heater.

The Charles Parker Company, Meriden, Conn., and 97 Chambers street, New York, are putting on the market

by a handsome metal ornament in harmony with the general design of the heater. The lamp, which is a Parker Mammoth central draft, rests about 2 inches from the floor, and is held firmly in a cast iron basket which is bolted to the base. This receptacle holds the lamp so that it cannot be upset even when the heater is being moved, as may easily be done by means of the handles, one at either side of the top piece. At



Fig. 1.—The Parker Portable Heater No. 3.

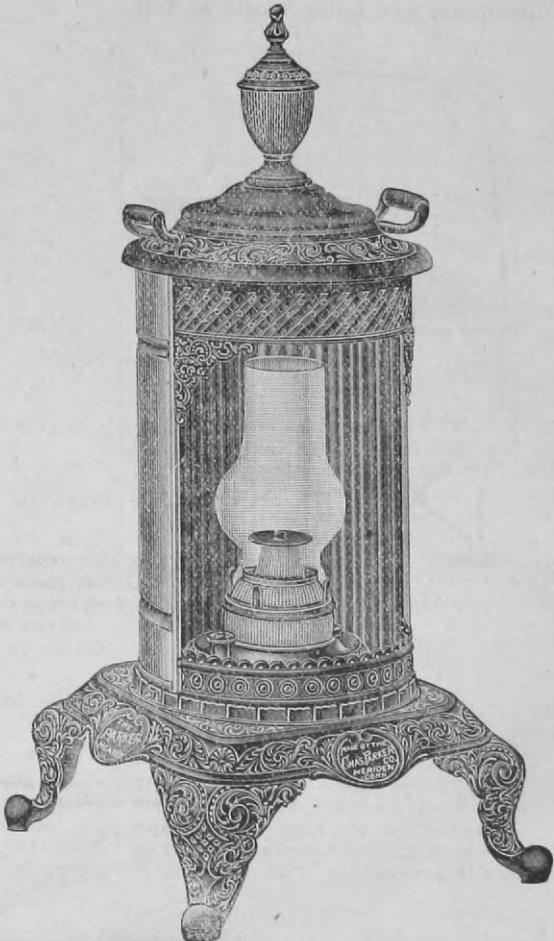


Fig. 2.—The Parker Portable Heater No. 5.

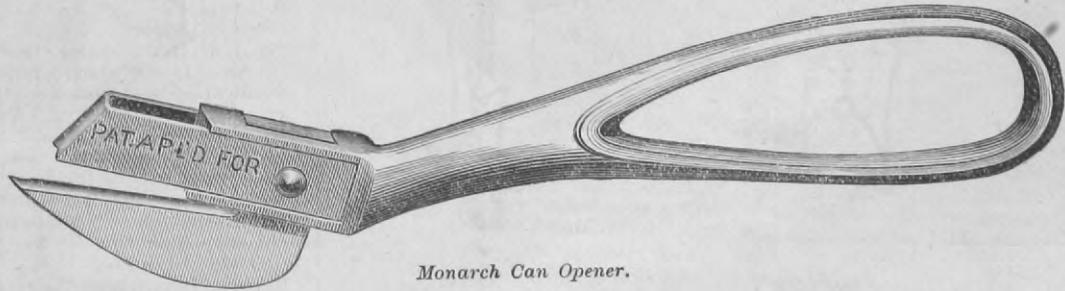
the labor and the quantity of water required.

Monarch Can Opener.

The cut herewith shown represents a can opener offered by the Electric Letter Box Company, Meriden, Conn., and C. F. Guyon Company, 97-99 Rude street,

the Parker portable heater, as shown in the accompanying engravings. The stove complete consists of an ornamental base of cast iron, nickel plated, to which a heavily enameled sheet metal cylinder is bolted. This extends slightly more than half around the base and is highly polished on the inner side to make a strong reflector. The top piece is cast

present this heater is made in three numbers, of which No. 3, the smaller, weighs 30 pounds, stands 37 inches high and has a diameter at base of $14\frac{1}{2}$ inches. This number is nickel finished, while Nos. 4 and 5 are polished nickel plated. The No. 4 is a little larger than the No. 3, and has a square base similar to No. 5. Other sizes and styles,



Monarch Can Opener.

New York. The handle of the tool is of cast iron and the blade of tempered steel. The fulcrum also is steel and the blade and fulcrum parts are securely fastened to the handle by a strong rivet. The entire article is aluminum plated, which finish, it is stated, is entirely new. It resembles aluminum in appear-

iron with an opening about the size of an ordinary stove hole, directly over the lamp. This is partially filled in with scroll work, admitting ready passage of heat, forming a rest for culinary utensils and preventing small articles from dropping through to the lamp. When not in use for cooking this is surmounted

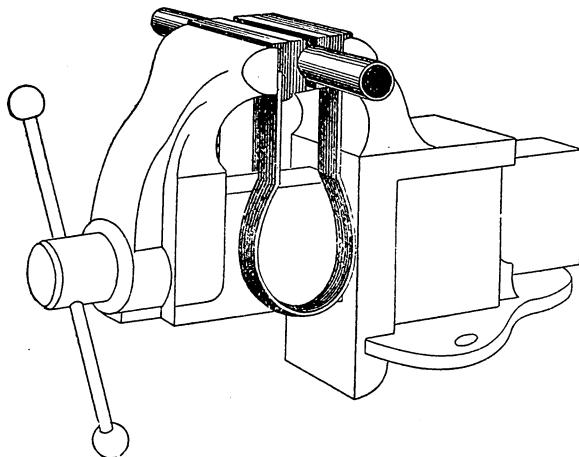
we are advised, are in course of preparation. The manufacturers refer to the heaters as being an advance in oil heating practice, more like a parlor stove in construction and appearance, simple in construction, powerful for heating, and absolutely free from offensive odors and smoke.

Spring Vise Jaws for Tubing.

The Newark Machine Tool Works, Newark, N. J., are offering spring vise jaws for tubing, as shown in the accom-

any required diameter up to and including $1\frac{1}{2}$ inches. The device is designed for holding tubing or any cylindrical piece which is too delicate or too highly finished to be held in a pipe vise, and is made with jaws of the fol-

adjusting screw and that it is a rapid grinder. The mills are packed half a dozen in a case.



Spring Vise Jaws for Tubing.

panying cut. The device is described as having jaws made of the best vulcanized fiber, securely fastened to pieces of the best malleable iron which have shoulders to catch on the jaws of the vise, and as being held together by a spring connection. When the vise is loosened to take out or to shift the work, the spring causes the jaws to

lowing lengths : 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5 and 6 inches.

The Brighton Pound Coffee Mill

Logan & Strobridge Iron Company, New Brighton, Pa., are placing on the market a pound coffee mill, No. 94, as herewith shown. The manufacturers



The Brighton Pound Coffee Mill.

open, following the motion of the vise. It is stated that the paper jaws nearly encircle the tubing, holding it so firmly that it cannot slip, and avoiding all danger of distorting the tube, or marring the finish of the surface. The grooves are made in the jaws to suit

state that the mill embodies many new features for this class of mill; that it is very compact, being but little larger than an ordinary coffee mill; that the can that holds the pound of coffee has a close fitting cover, making it air tight; that the mill is provided with a lock nut

CONTENTS.

	PAGE
The Morgan 1000-Ton Forging Press. Ill.	741
The Okhta Armor Plate Trials.....	742
Comparison of Strength in Specialty Mixtures of Cast Iron.....	743
Shop System. Illustrated.....	746
A Lesson In Milling. Illustrated.....	749
Garrett Rod Mill.....	749
Rolling Wire Rods Directly from Small Ingots. Illustrated.....	750
A New Gaseous Constituent of Our Atmosphere.....	751
The Hartford Automatic Screw Machinery.—II. Illustrated.....	752
The Iron Ores of the Mediterranean Seaboard.—II.....	754
The Week.....	755
Editorials:	
The Importance of Technical Improvements.....	756
Special Tools and Dull Times.	756
The Anthracite Coal Trade.....	756
Personal ..	757
The Naval Architect.....	757
Washington News... ..	757
Western Foundrymen's Association.....	758
New Machinery for the "Chicago".....	759
A Wonderful Record.....	759
Important Advances in Freight Rates....	759
The Mechanical Engineers' Test Bars.	759
Manufacturing:	
Iron and Steel... ..	760
Machinery.....	761
Hardware.....	761
The Iron and Metal Trades:	
Philadelphia.....	762
Chicago.....	762
Louisville.....	763
Birmingham.....	763
Pittsburgh.....	764
St. Louis.....	765
Cincinnati.....	765
New York.....	765
Metal Market.....	766
British Metal Market.....	766
Hardware:	
Condition of Trade.....	767
Notes on Prices.....	769
The Hardware Club	769
Hardware Notes at the Convention of the Carriage Builders' National Association of the United States.	770
Pneumatic Wheels	770
Bicycle Notes.....	771
The Warren Cutlery Cabinet. Illus....	772
The Cary Building.....	773
John Chatillon & Sons' Catalogue.....	773
Grand Rapids Hand Screw Company....	773
Trade Items	773
Price-Lists. Circulars, &c.	778
It Is Reported—	774
Paints and Colors.....	774
The Hatch Hand Pruning Shear. Illus....	775
Improved Joiners' Clamp. Illustrated....	775
McGill's Improved Fasteners. Illus....	775
The Monarch Frame Pulley. Illus....	776
Woodite Ware. Illustrated.....	776
Protractor Miter. Illustrated.....	776
The Bernard Folding Dividers. Illus....	777
The Brighton Hand Vise. Illustrated....	777
The Lancing Runner. Illustrated...	777
Bommer's Compound Spiral Spring Hinges. Illustrated.....	777
Herrick's Hammer and Hatchet Case. Illustrated.....	778
Twist Drill Grinding Gauge and Chart. Illustrated.....	778
The Western Combination Washer. Ill.	778
Monarch Can Opener. Illustrated....	779
The Parker Portable Heater. Illus....	779
Spring Vise Jaws for Tubing. Illus....	780
The Brighton Pound Coffee Mill. Illus....	780
Current Hardware Prices	781
Current Metal Prices	782

Current Hardware Prices.

OCTOBER 31, 1894.

NOTE.—The quotations given below represent Current Hardware Prices, whether made by manufacturers or jobbers. They apply to such quantities of goods as are usually purchased by retail Hardware merchants. Very small orders and broken packages often command higher prices.

The character @ is used to indicate a range of price: thus discount 50 & 10% @ 50 & 10 & 5%, signifies that the goods in question are sold at prices ranging from 50 & 10% to 50 & 10 & 5%.

Adjusters, Blind—

Domestic..... \$8.00 83¢@83¢@10%
Excelsior..... \$8.00 10%
North's..... list net @ 10%
Zimmerman's—See Fasteners, Blind.

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—

American—

Bagle Anvils, 15¢@15¢@5%
Horse shoe brand, Wrought..... 94¢@10%
Barnes Mfg. Co. 50¢

Imported—

Armitage Mouse Hole..... 88¢@01¢@4¢
S. & H., machine finished..... 98¢@10¢@4¢
Trenton..... 9¢@1¢@2¢
Peter Wright's..... 98¢@10¢@4¢

Anvil Vise and Drill—

Allen Anvil and Vise \$3.00..... 40¢@10%
Cheney Anvil and Vise..... 25¢
Miners Falls Co., \$18.00..... 20¢
Holt's..... 40¢@10¢@10%

Apple Parers—See Parers, Apple, &c.

Augers and Bits—

Boring Machine Augers..... 70¢@70¢@10%
Car Bits, 12-in. twist..... 50¢
Common Augers and Bits..... 70¢@70¢@10%
Cincinnati Bell-Hangers Bits..... 40¢
Forster Pat. Auger Bits..... 25¢
Jennings' Pattern Car Bits..... 40¢
Jennings' Pattern Auger Bits..... 60¢
Jennings & Co., No. 10, extension..... 40¢
J. E. Jennings & Co., No. 30..... 60¢
J. E. Jennings & Co., Auger Bits, 8 set..... 92¢@quarters, No. 5 35¢; No. 8 63.50¢@25¢
Russell Jennings' Augers and Bits 25¢@10%
Lewis' Patent Single twist..... 45¢
L'Hommedieu Car Bits..... 15¢@10%
Pugh's Black..... 20¢
Pugh's Jennings Pattern..... 30¢
Snell's Bits..... 60¢@60¢@10%

Bit Stock Drills—

Cleveland..... 50¢@10¢@5%
Cincinnati, for wood..... 40¢@10¢@10%
Cincinnati, for metal..... 50¢@50¢@10%
Morse Twist Drills..... 50¢@10¢@5%
New Process Twist Drill Co..... 50¢@10¢@5%
Standard..... 50¢@10¢@5%
Syracuse, for metal..... 50¢@10¢@5%
Syracuse, for wood (wood list) 30¢@10¢@10%

Expansive Bits—

Clark's small \$18; large \$26..... 40¢@40¢@5%
Ives No. 4. \$1.00..... 40¢@40¢@10%
Stearns No. 1, \$2.00..... 40¢@40¢@5%
Stearns' No. 2, \$4.80..... 40¢@40¢@10%
Swan's..... 40¢@40¢@10%

Gimlet Bits—

Bee..... 25¢@25¢@10%
Common..... \$ gross \$2.50@83¢@8.00
Diamond..... \$1.25..... 40¢@10¢@5%
Double Cut:
Hartwell's..... \$1.00..... 40¢@10¢@10%
Douglas'..... 40¢@10¢@5%
Ives..... 60¢@10¢@60¢@10¢@5%
Shepardson's..... 45¢@10¢@5%@10¢@5%

Hollow Augers—

Bonney's Adjustable, 8 doz..... \$21.00
Cincinnati Adjustable..... 25¢@10%
Cincinnati Standard..... 25¢@10%
Douglas'..... 83¢@83¢@10%
French, Swift & Co. (Beecher)..... 83¢@83¢@10%
Ives'..... 83¢@83¢@10%
Ives' Expansive, each \$4.50..... 50¢@5%
Stearns'..... 20¢@10%
Universal Expansive, each \$4.50..... 20¢@10%
Wood's, 8 doz, \$48..... 25¢@10%

Ship Augers and Bits—

L'Hommedieu's..... 15¢@10¢@15¢@10%
Snell's..... 25¢@25¢@10%
Snell's Ship Auger Pattern Car Bits..... 15¢@10¢@15¢@10%
Watrous'..... 25¢@25¢@10%

Awl Hafts—See Hafts, Awl.

Awls—

Brad, Handled..... \$ gr. \$2.50@83¢@8.00
Brad, Shouldered..... \$ gr. \$1.00@83¢@1.40
Peg, Plain..... \$ gr. \$1.00@83¢@8.00
Peg, Should..... \$ gr. \$1.50@83¢@1.50
Scratch, Handled..... \$ gr. \$1.00@83¢@1.50
Scratch, Socket..... \$ doz. \$1.10@83¢@1.50

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First quality, best brands..... \$6.00@83¢@8.00
First quality, other brands..... 5.50@8.00
Beveled add 50¢@ doz.

Axle Grease—See Grease, Axle.

Axes—

No. 1 Common..... \$6.00@83¢@8.00
No. 2 Common..... 4.00@4.00@8.00
No. 7 to 14..... 70¢@8.00
No. 15 to 18..... 47¢@8.00@8% cash
No. 19 to 22..... 70¢@8.00
Concord, loose collar, 4¢@4.00@8.00
Concord, solid collar, 5¢@5.00@8.00

Bag Holders—See Holders, Bag.

Balances—

Sash—

Caldwell, low list..... 30¢
Pullman..... 60¢
Sensible..... 60¢

Spring—

Spring Balances..... 40¢@10¢@50¢
No. 2000 20 30

Chatillon, \$ doz. 80.80 95¢ 1.75 net
Chatillon Straight Balances..... 40¢@40¢@10%
Chatillon Circular Balances..... 50¢@10%

Bars Wire—See Wire, Barb.

Bars—

Crow—

Cast Steel..... \$ doz. 24¢@24¢@3¢
Iron, Steel Points..... \$ doz. 24¢@24¢@3¢

Basins, Wash—

Standard Fibreware, No. 1, 10¢@in. \$1.80;
12-inch, \$2.00; 18¢@in. \$2.60.

Beams Scale—

Scale Beams, List Jan. 1, '94..... 50¢@10¢@50¢@5%
Chatillon's No. 1..... 40¢
Chatillon's No. 2..... 50¢@10¢@50¢@5%
Custers'..... 83¢@5%

Beaters—

Egg—

Bryant's..... \$ gross \$14.00
Double (H. & R. Mfg. Co.)..... \$ gro. 0.00
\$12.00; No. 1, \$16.00; No. 2, \$36.00

Dover..... \$ doz. \$1.00; \$ gro. \$10.50

Dover, Ex. Family Size..... \$ doz. \$3.50

Dover (Standard Co.)..... \$ doz. \$1.00

Duplex (Standard Co.)..... \$ doz. \$1.00

Duplex Extra Heavy (Standard Co.)..... \$ doz. \$3.50

Easy (H. & R. Mfg. Co.)..... \$ gro. \$12.00

Improved Acme (H. & R. Mfg. Co.)..... \$ gro. \$12.00

Silver & Co. \$ doz. \$4.00

Spiral..... \$ gro. \$2.25@2.50

Triple (H. & R. Mfg. Co.)..... \$ gro. \$16.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
No. 2, \$2..... 20¢@20¢@2¢

Bells—

Cow—

Common Wrought..... 60¢@10%
Kentucky Durham..... 70¢@10%

Kentucky, Sargent's list..... 70¢@10%

Kentucky "Star"..... 20¢@10%

Texas Star..... 50¢@10¢@10%

Western, Sargent's list..... 70¢@10%

Door—

Crank, Brooks'..... 50¢@10¢@2¢

Crank, Cone's..... 10¢

Crank, Connel's..... 20¢@10%

Gong, Abbe's..... 33¢@10%

Gong, Barton's..... 40¢@10¢@50¢

Gong, Yankee..... 45¢@10%

Lever, R. & E. Mfg. Co.'s..... 50¢@10¢@10%

Lever, Sargent's..... 60¢@10%

Lever, Taylor's Bronzed or Plated, net

Lever, Taylor's Japanned..... 25¢@10%

Full, Brooks'..... 50¢@10¢@2¢

Electric—

Bigelow & Dowse..... 20¢@20¢@10%

Wollenkars'..... 20¢@20¢@10%

Hand—

Extra Heavy Brass..... 70¢

Light Brass..... 70¢@10¢@70¢@10%
Silver Chime..... 33¢@10%

White..... 70¢@10¢@10%

Globe Cone' Patent..... 25¢@10¢@35¢

Miscellaneous—

Call..... 45¢@50¢

Farm Bells..... \$ doz. 24¢

Steel Alum Church and School Bells, 50¢

Bellows—

Blacksmiths'..... 80¢@10¢@70¢@10%

Hand Bellows..... 50¢@50¢@10¢@10%

Molders'..... 50¢@50¢@10¢@10%

Belt Rubber—

Common Standard..... 75¢@10¢@5%@10%

Extra..... 80¢@10¢@5%@10%
Standard..... 70¢@10¢@75¢@10%

N. Y. B. & P. Co. Carbon..... 60¢@10¢@10%

N. Y. B. & P. Co., Double Diamond..... 60¢
N. Y. B. & P. Co., 1846 Para..... 40¢@10%

Brackets—

Shelf, fancy, Sargent's list..... 70¢@70¢@10%

Shelf, plain, Other made at a wide range of prices.

Braces—

Barber's..... 50¢@10%

Armstrong's..... 50¢@5%

Common Ball, American..... \$1.00@\$1.10

David Patent..... 50¢@10%

Fray's Genuine Spofford's..... 50¢@10%

Fray's Nos. 70 to 120, 81 to 123, 207 to 414
50¢@10%
60¢@10%
70¢@10%
80¢@10%
90¢@10%
100¢@10%
110¢@10%
120¢@10%
130¢@10%
140¢@10%
150¢@10%
160¢@10%
170¢@10%
180¢@10%
190¢@10%
200¢@10%
210¢@10%
220¢@10%
230¢@10%
240¢@10%
250¢@10%
260¢@10%
270¢@10%
280¢@10%
290¢@10%
300¢@10%
310¢@10%
320¢@10%
330¢@10%
340¢@10%
350¢@10%
360¢@10%
370¢@10%
380¢@10%
390¢@10%
400¢@10%
410¢@10%
420¢@10%
430¢@10%
440¢@10%
450¢@10%
460¢@10%
470¢@10%
480¢@10%
490¢@10%
500¢@10%
510¢@10%
520¢@10%
530¢@10%
540¢@10%
550¢@10%
560¢@10%
570¢@10%
580¢@10%
590¢@10%
600¢@10%
610¢@10%
620¢@10%
630¢@10%
640¢@10%
650¢@10%
660¢@10%
670¢@10%
680¢@10%
690¢@10%
700¢@10%
710¢@10%
720¢@10%
730¢@10%
740¢@10%
750¢@10%
760¢@10%
770¢@10%
780¢@10%
790¢@10%
800¢@10%
810¢@10%
820¢@10%
830¢@10%
840¢@10%
850¢@10%
860¢@10%
870¢@10%
880¢@10%
890¢@10%
900¢@10%
910¢@10%
920¢@10%
930¢@10%
940¢@10%
950¢@10%
960¢@10%
970¢@10%
980¢@10%
990¢@10%
1000¢@10%
1010¢@10%
1020¢@10%
1030¢@10%
1040¢@10%
1050¢@10%
1060¢@10%
1070¢@10%
1080¢@10%
1090¢@10%
1100¢@10%
1110¢@10%
1120¢@10%
1130¢@10%
1140¢@10%
1150¢@10%
1160¢@10%
1170¢@10%
1180¢@10%
1190¢@10%
1200¢@10%
1210¢@10%
1220¢@10%
1230¢@10%
1240¢@10%
1250¢@10%
1260¢@10%
1270¢@10%
1280¢@10%
1290¢@10%
1300¢@10%
1310¢@10%
1320¢@10%
1330¢@10%
1340¢@10%
1350¢@10%
1360¢@10%
1370¢@10%
1380¢@10%
1390¢@10%
1400¢@10%
1410¢@10%
1420¢@10%
1430¢@10%
1440¢@10%
1450¢@10%
1460¢@10%
1470¢@10%
1480¢@10%
1490¢@10%
1500¢@10%
1510¢@10%
1520¢@10%
1530¢@10%
1540¢@10%
1550¢@10%
1560¢@10%
1570¢@10%
1580¢@10%
1590¢@10%
1600¢@10%
1610¢@10%
1620¢@10%
1630¢@10%
1640¢@10%
1650¢@10%
1660¢@10%
1670¢@10%
1680¢@10%
1690¢@10%
1700¢@10%
1710¢@10%
1720¢@10%
1730¢@10%
1740¢@10%
1750¢@10%
1760¢@10%
1770¢@10%
1780¢@10%
1790¢@10%
1800¢@10%
1810¢@10%
1820¢@10%
1830¢@10%
1840¢@10%
1850¢@10%
1860¢@10%
1870¢@10%
1880¢@10%
1890¢@10%
1900¢@10%
1910¢@10%
1920¢@10%
1930¢@10%
1940¢@10%
1950¢@10%
1960¢@10%
1970¢@10%
1980¢@10%
1990¢@10%
2000¢@10%
2010¢@10%
2020¢@10%
2030¢@10%
2040¢@10%
2050¢@10%
2060¢@10%
2070¢@10%
2080¢@10%
2090¢@10%
2100¢@10%
2110¢@10%
2120¢@10%
2130¢@10%
2140¢@10%
2150¢@10%
2160¢@10%
2170¢@10%
2180¢@10%
2190¢@10%
2200¢@10%
2210¢@10%
2220¢@10%
2230¢@10%
2240¢@10%
2250¢@10%
2260¢@10%
2270¢@10%
2280¢@10%
2290¢@10%
2300¢@10%
2310¢@10%
2320¢@10%
2330¢@10%
2340¢@10%
2350¢@10%
2360¢@10%
2370¢@10%
2380¢@10%
2390¢@10%
2400¢@10%
2410¢@10%
2420¢@10%
2430¢@10%
2440¢@10%
2450¢@10%
2460¢@10%
2470¢@10%
2480¢@10%
2490¢@10%
2500¢@10%
2510¢@10%
2520¢@10%
2530¢@10%
2540¢@10%
2550¢@10%
2560¢@10%
2570¢@10%
2580¢@10%
2590¢@10%
2600¢@10%
2610¢@10%
2620¢@10%
2630¢@10%
2640¢@10%
2650¢@10%
2660¢@10%
2670¢@10%
2680¢@10%
2690¢@10%
2700¢@10%
2710¢@10%
2720¢@10%
2730¢@10%
2740¢@10%
2750¢@10%
2760¢@10%
2770¢@10%
2780¢@10%
2790¢@10%
2800¢@10%
2810¢@10%
2820¢@10%
2830¢@10%
2840¢@10%
2850¢@10%
2860¢@10%
2870¢@10%
2880¢@10%
2890¢@10%
2900¢@10%
2910¢@10%
2920¢@10%
2930¢@10%
2940¢@10%
2950¢@10%
2960¢@10%
2970¢@10%
2980¢@10%
2990¢@10%
3000¢@10%
3010¢@10%
3020¢@10%
3030¢@10%
3040¢@10%
3050¢@10%
3060¢@10%
3070¢@10%
3080¢@10%
3090¢@10%
3100¢@10%
3110¢@10%
3120¢@10%
3130¢@10%
3140¢@10%
3150¢@10%
3160¢@10%
3170¢@

Plane..... 455
Homer's Night Latches..... 155
R. & M. Mfg. Co., list Mar. 20, 1889..... 60 & 10 & 70
Sargent & Co., List July, 1894. 60 & 10 & 70
Warner's Burglar Proof. 70 doz. \$3.00, 50%

Elevator-

Moore's 383 1/4

Padlocks-

Wrought Iron Padlocks:
Brittan, Graham & Mathes, list Jan. 1894..... 75¢
Mallory, Wheeler Co., list Jan. 1, 1894..... 75¢
Norwich Lock Mfg. Co., list June 10, 1891..... 60 & 25
Russell & Erwin Mfg. Co., list June 10, 1891..... 60 & 25
Sargent & Co., list January 1, 1894..... 75¢
William Wilcox Mfg. Co., list January 1, 1894. 75¢ & 20%

Ames Sword Co. up to No. 103 incl. 50¢
Ames Sword Co. above No. 103. 50 & 10¢
Barnes Mfg. Co. 40 & 40 & 10¢
Champion Padlocks. 40¢
A. E. Deltz. 40¢
Magie. 40¢
Mureka, Eagle Lock Co. 40 & 25¢
E. T. Frafim's Keystone Scandinavian. 10¢ & 50¢
120 line. 90 & 25¢
109 line. 65¢
110 line. 70 & 10¢
220, 610 and 209 Lines. 70¢
All other numbers. 50 & 25¢

Bethshe. 70¢ doz. \$5. 50 & 10 & 10¢
Hotchkiss. 30¢
Koos'. 30¢
Bomer's Nos. 0 to 91. 30¢
Bomer's Scandinavian, &c., Nos. 100 to 505. 15¢
Scandinavian. 30 & 30¢
Staymeyer, Barry & Co. 30¢
No. 1010 line. 90¢
No. 41 line. 50¢
No. 61 line. 60¢
No. 21 line. 70¢
No. 109 line. 90 & 40¢
Star. 60¢
Yale Lock Mfg. Co.'s. net prices

Sash, &c.-

Attwell Mfg. Co. 25 & 33 1/2¢
Champion Safety List, 1893. 70¢
Clark's No. 1, \$10; No. 2, 55¢ gr. 83 1/2¢
Common Sense, Jap'd, Cop'd, &c. 55¢ gr. 4.00
Common Sense, Nickel Plated. 5¢ gr. \$10.00
Corbin's Daisy, list Feb. 15, 1888. 70¢
Davis Bronze. Barnes Mfg. Co. 60¢
Ferguson's. 33 1/2¢
Fish (Lesche's pat.), No. 100. 5¢ gr. 83 1/2¢
No. 105. 5¢ gr. 10.00
Giant, list Jan. 1892. 70 & 10¢
Hammond's Window Springs. 40¢
Hugunin's New Sash Locks. 25 & 25 1/2¢
Hugunin's Sash Balances. 25 & 25 1/2¢
Ives' Patent. 60 & 10 & 5 & 50 & 10 & 10¢
Kempshall's Gravity. 60¢
Kempshall's Model. 60 & 60 & 10¢
Monarch. 50¢
Payson's Perfect. 60 & 10 & 2 & 10 & 10¢
Reading. 60 & 10 & 10 & 10 & 10¢
Security. 70¢
Universal. 30¢
Victor. 60 & 10 & 2 & 10 & 10¢
Walker's. 10¢
Wolcott's. 60 & 10 & 5¢

Lumber Tools-

See Tools, Lumber.

Lustro-

our-ounce bottles. 70¢ doz. \$1.75; 1/2 gross. \$17.00

Machines.

Boring-

Without Angles. Upright. Angular.
Boss, Carpenters' 9.50
Boss, Ship Bldrs'. 3.75
Douglas. 55.50 \$6.75..... 50¢
Jennings'. 5.50 6.75..... 50¢ & 55¢
Miller's Falls. 7.50..... 25¢
Phillip's Patent with Auger. 7.00 7.50..... 40 & 10 & 10¢
Snell's, Rice's Pat. 5.50 6.75..... 40 & 10 & 10¢

Fluting-

American, 5 in., \$3.00; 5 in., \$3.40; 7 in., \$4.50 each. 35¢
Combined Fluter and Sash Iron. 70¢ doz. \$15.00..... 80¢
Crown, 4 1/2 in., \$3.50; 6 in., \$4.00; 8 in., \$5.50 each. 35¢
Crown Hand Fluter, No. 1, \$15.00; 2, \$12.50; 3, \$10.00; 4, \$8.25 each. 35¢
Crown Jewel, 6 in. \$3.50 each. 35¢
Domestic Fluter. \$3.50 each. 1.50
Eagle, 3/4-inch Rolls, \$2.15..... 35¢
Eagle, 5/4-inch Rolls, \$2.35..... 35¢
Knob, 3/4-inch Rolls. \$2.25 each. 35¢
Knob, 6-inch Rolls. \$3.80 each. 35¢

Hoisting-

Moore's Anti-Friction Differential Pulley Block. 20¢
Moore's Hand Hoist, with Lock Brake. 20¢
Moore's Rope Differential Pulley Block. 60¢
Maris & Breeley (Teal Patent). 80¢
See also Block.

Washing-

Fair and Square. 70¢ doz. \$42.00
Anthony Wayne. 70¢ doz. No. 1, \$42; No. 2, \$38; No. 3, \$42.
Wayne American. 70¢ doz. \$36.00
Welsell. 70¢ doz. \$36.00
Western Star 70¢ doz. No. 2, \$36 No. 3, \$39

Mallets-

B. & L. Block Co., Hickory & L. V. 30 & 10 & 10¢
Fibre Head, Stearns. 33 1/2¢
Hickory. 20 & 10 & 20 & 10 & 10¢
Lignumvitae. 20 & 10 & 20 & 10 & 10¢

Mattocks-

Regular list. 60 & 10 & 60 & 10 & 5¢

Measures-

Standard Fibreware, No. 1, peck. 70¢ doz. \$3.50; 1/2-peck, \$3.00

Meat Cutters-

See Cutters, Meat.

Menders-

Harness. 70¢ doz. \$1.75
Hudson's Hose Menders, in set, 70¢ doz. 60¢
Hudson's Hose Bands. 5¢ gr. \$1.25

Milk Cans—See Cans, Milk.

Mills-

Coffee-

Box and Side, List, Jan. 1, 1888. 60 & 60 & 10 & 10¢
Net prices are often made which are lower than above discount.

Ames, Enterprise Mfg. Co., list Jan. 17, 1894. 60 & 60 & 10 & 10¢
National List, Jan. 1, 1894. 60 & 60 & 10 & 10¢
Swift, Lane Bros. 60 & 60 & 10 & 10¢
Waddell's New Body Mills, Ideal Brand, New List. 60 & 60 & 10 & 10¢

Mincing Knives-

See Knives, Mincing.

Molasses Gates-

See Gates, Molasses.

Money Drawers-

See Drawers, Money.

Mowers, Lawn-

10 in. 12 in. 14 in.
Best. \$4.00 & 25¢. \$4.50 & 60¢. \$5.00 & 65¢.
Good. \$2.00. 83 1/2¢. \$3.50.
Cheap. 2.25. 2.50. 2.75

Muzzles-

70¢ doz. \$3.00, 25¢

Nails-

Cut and Wire. See Trade Report.

Wire Nails, Papered.

Association list, May 1, '92. 85 & 10 & 10¢

88 & 10 & 5¢. Hungarian, Finishing, Upholsterers, &c. See Trade.

Horse-

Nos. 6 7 8 9 10

A. C. 25¢ 23¢ 22¢ 21¢ 20¢

40 & 10 & 10¢

American. 9/4 9/4 9/4 9/4 9/4. net

Anchor. 25¢ 23¢ 22¢ 21¢ 20¢

40 & 5 & 25¢.

Capewell. 19¢ 18¢ 17¢ 16¢ 15¢

10 & 10 & 10¢. 10 & 10 & 10¢

C. B. K. 26¢ 23¢ 22¢ 21¢ 20¢

40¢

Champion. 25¢ 23¢ 22¢ 21¢ 20¢

10 & 10 & 10¢. 10 & 10 & 10¢

Champlain. 28¢ 26¢ 25¢ 24¢ 23¢

10 & 5 & 10¢. 10 & 5 & 10¢

Clinton, Fin. 19¢ 17¢ 16¢ 15¢ 14¢

30 & 30 & 25¢. 30 & 30 & 25¢

Empire Brouzed. 17¢ 16¢ 15¢ 14¢ 13¢

30 & 30 & 25¢. 30 & 30 & 25¢

Essex. 28¢ 26¢ 25¢ 24¢ 23¢

10 & 5 & 10¢. 10 & 5 & 10¢

Lyra. 25¢ 23¢ 22¢ 21¢ 20¢

50 & 10 & 5¢. 50 & 10 & 5¢

Maud S. 25¢ 23¢ 22¢ 21¢ 20¢

50 & 10 & 5¢. 50 & 10 & 5¢

Northwest'n. 25¢ 23¢ 22¢ 21¢ 20¢

25 & 25 & 5¢. 25 & 25 & 5¢

Putnam. 23¢ 21¢ 20¢ 19¢ 18¢

15¢. 25¢

Snowden. 21¢ 19¢ 18¢ 16¢ 15¢

net. 25¢

Standard. 23¢ 21¢ 20¢ 19¢ 18¢

15¢. 25¢

Vulcan. 23¢ 21¢ 20¢ 19¢ 18¢

25¢. 25¢

Western. 23¢ 21¢ 20¢ 19¢ 18¢

30¢. 25¢

Picture.

Nail Pullers—See Pullers, Nail.

Nail Sets—See Sets, Nail.

Nippers—See Pliers and Nippers.

Nut Crackers-

See Crackers, Nut.

Nuts—List Dec. 18, 1889.

Square, Hex.

Cold Punched. 54¢ 53¢ off list

Hot Pressed. 64¢ 63¢ off list

In packages of 100 lb. add 1-10¢. 70¢ lb.

net; in packages less than 100 lb. add 1¢ lb. net.

Oakum—

Best or Government. 70¢ doz. \$6. 6¢

Navy. 70¢ doz. \$5. 6¢

U. S. Navy. 70¢ doz. \$5. 6¢

Oil Tanks—See Tanks, Oil.

Oilers-

Brass and Copper. 50 & 10 & 50 & 10 & 5¢

Zinc and Tin. 70 & 70 & 10¢

Broughton's Brass. 50¢

Broughton's Zinc. 50¢

Malleable, Hammers' Improved, No. 1.

\$8. 60; No. 2, \$4. 00; No. 3, \$4. 40. 70¢ doz.

Malleable, Hammers' Old Pattern, same list.

Olmstead's Brass and Copper. 50¢

Olmstead's Tin and Zinc. 60¢

Prior's Pat. or "Paragon" Brass. 60¢

Prior's Pat. or "Paragon" Zinc. 70¢

Steel, Draper & Williams. 60¢

Wilmot & Hobbs Mfg. Co., Steel Anti-Rust. 60¢

Openers, Can-

American. 70¢ gross \$1.75 & \$2.00

Champion. 70¢ doz. \$2.00. 50¢

Domestic. 70¢ doz. \$2.00

Duplex. 70¢ doz. 25¢ 25¢ 15¢

Eureka. 70¢ doz. \$2.50. 10¢

Excelsior, No. 1 \$2.50; No. 2, \$1.50. 40¢

French, No. 4. 70¢ doz. \$2.25. 55¢ & 60¢

Iron Handle, No. 5. 70¢ gr. \$6. 00. 45¢ & 50¢

Lyman's. 70¢ doz. \$3.75. 20¢

Messenger's Comet. 70¢ doz. \$3.00. 25¢

Moore's. 70¢ doz. 75¢

Sardine Scissors. 70¢ doz. \$2.75 & \$3.00

Sprague, No. 1, 55¢; 2, 60¢; 3, 65¢

Streeter's. 70¢ doz. \$2.75

Sensible, Japanned, per doz. 60¢

Sensible, Nickel, per doz. 75¢

Surprise, per doz. 25¢

New Sprague, Metallic H'dle, per doz. 50¢

New Sprague, Wood H'dle, per doz. 50¢

Universal. 70¢ doz. \$3.00. 55¢ 55¢

World's Best. 70¢ gross. No. 1. \$12.00; No. 2. \$24.00; No. 3. \$36.00. 50 & 10 & 50¢

Packing, Steam-

Rubber-

Standard, fair quality. 70 & 10 & 75¢

Inferior quality. 75 & 10 & 80¢

Extra. 60 & 10 & 60 & 10 & 55¢

Jenkins Standard. 70¢ b. 80¢. 25 & 25 & 55¢

N. Y. B. & F. Co., Double Diamond. 60¢

N. Y. B. & F. Co., Salamander. 45¢

N. Y. B. & F. Co., Carbon. 70¢ & 55¢

Miscellaneous—

American Packing. 9/4 10¢ W. D.

Cotton Packing. 14/4 15¢ W. D.

Italian Packing. 13/4 18¢ W. D.

Jute. 16/4 20¢ W. D.

Bussia Packing. 18/4 24¢ W. D.

Plates—

70¢ doz. 65¢ 65¢

75¢ doz. 70¢ 70¢

80¢ doz. 75¢ 75¢

85¢ doz. 80¢ 80¢

90¢ doz. 85¢ 85¢

95¢ doz. 90¢ 90¢

100¢ doz. 95¢ 95¢

105¢ doz. 100¢ 100¢

110¢ doz. 105¢ 105¢

115¢ doz. 110¢ 110¢

120¢ doz. 115¢ 115¢

125¢ doz. 120¢ 120¢

130¢ doz. 125¢ 125¢

135¢ doz. 130¢ 130¢

140¢ doz. 135¢ 135¢

145¢ doz. 140¢ 140¢

150¢ doz. 145¢ 145¢

155¢ doz. 150¢ 150¢

Pullers Nail-

Eclipse..... \$ doz. \$24.00 40¢
Economy..... \$ doz. \$5.50 @5¢
Ellrich..... \$ doz. \$1.00
Giant, No. 1..... \$ doz. \$18.00 10¢ & 10¢
Giant, No. 2..... \$ doz. \$18.00 10¢ & 10¢
Pelican..... \$ doz. \$9.00 20¢ & 10¢
Sargent's..... \$ doz. \$18.00 35¢ @35¢ & 10¢

Pulleys-

Brass Screw..... 70¢
Hay Fork, "Anti-Friction," 5 in. solid. \$5.70..... 50¢
Hay Fork, "F" Common and Patent Busted..... 20¢
Hay Fork, Moore's Anti-Friction 5 in. Wheel, \$ doz. \$12.00..... 40¢
Hay Fork, Reed's Self-Lubricating..... 60¢
Hay Fork, Solid Eye, \$4.00; Swivel, \$4.50..... 60¢ & 10¢ @50¢ & 10¢
Hay Fork, Stearns' Nos. 35 & 45, \$10.00
Hay Fork, Stearns' Nos. 15, 25, 55, 65, 60¢
Hay Fork, Tarbox Pat. Iron..... 20¢
Hot House, Awning, &c. 66¢ @67¢
Japanned Clothes Line..... 60¢ @68¢
Japanned Screw..... 70¢ @8¢
Japanned Side..... 70¢ @8¢
Moore's Ceiling or End, Anti-Friction 40¢
Moore's Dumb Waiter, Anti-Friction 50¢
Moore's Electric Light..... 88¢ @89¢
Moore's Side, Anti-Friction..... 50¢
Sash (Auger Mortise). On bbl. lots ex. 5¢
Common Sense..... 60¢
Empire..... 60¢
Acme..... 60¢
Ideal, Nos. 2, 4, 10 & 15..... 60¢ less 1¢
Star..... doz. net.
Ideal, or IXL No. 60..... \$ doz. 22¢ net.
Shade Rack..... 45¢
Shepard's Niagara, No. 25. \$ doz 25¢ net
Tackie Blocks—See Blocks.

Pumps—

Ostern, Best Makers..... 60¢ & 10¢ @70¢
Pitcher Spout, Best Makers, 70@10¢ 75¢ & 5¢
Pitcher Spout, Cheaper G'd's. 75¢ & 10¢ 80¢
Meyer's Pumps, low list..... 50¢
Detroit Valve & Washer Co.'s Pump Leathers..... \$ gro \$8.00

Punches—

Avery's Revolving..... 40¢
Avery's Sawset, Punch—See Sawsets
Bemis & Call Co.'s Cast Steel Drive. 50¢ & 5¢
Bemis & Call Co.'s Check..... 55¢
Bemis & Call Co.'s Spring..... 50¢ & 5¢
Bemis & Call Co.'s Springfield Socket. 65¢
Niagara Hollow Punches..... 20¢ & 2¢
Niagara Solid Punches..... 55¢
Hico Hand Punches..... 15¢
Saddler's or Drive, good. \$ doz. 60¢ & 5¢
Spring, good quality. \$ doz. \$2.50 @ \$2.60
Spring, Leach's Pat. 15¢
Solid Tinner's, P. S. & W. Co. \$ doz. \$1.44..... 55¢
Tinner's Hollow Punches, P. S. & W. Co. 20¢ & 2¢

Rail—

Barn Door, Light. In. 3¢ 5¢ 7¢
Per 100 feet. \$1.75 2.10 2.75
B. D. for N. E. Hangers—
Small. Med. Large.
Per 100 feet.... \$2.00 2.50 3.00 Net
Carrier, double braced. Steel Rail, 3¢
foot. 34¢
Lundy Parlor Door, Planed Edge. \$ ft. 7¢
Moody Steel Rail, \$ ft. 5¢. 45¢ & 5¢
Moore's Steel Rail..... 55¢
Sliding Door, Bronzed W't Iron. W't. 6¢
Sliding Door, Iron, Painted. \$ ft. 2¢
Sliding Door, W't. Brass. \$ ft. 35¢ & 5¢
Terry's Steel Rail. \$ ft. 4¢
Victor Track Rail, 7¢ \$ foot. 50¢ & 10¢

Rakes—

Cast Steel, Association g'd's. 70@70¢ & 2¢
Cast Steel, outside goods.... 70@70¢ & 2¢
Malleable, good. 70@70¢ & 2¢
Fort Madison Prize Bow Brace and Peerless. 75¢
Fort Madison Steel Tooth Lawn Rake. 65¢
\$6.00. 35¢
Gibbs' Acme Lawn Rake. \$ doz. \$4.90
Gibbs' Canton Lawn Rake. \$ doz. \$3.75
Gibbs' Crown Lawn Rake, No. 1. \$ doz. \$4.90
\$ doz. \$4.90; No. 2. 85. 30
Gibbs' Favorite Lawn Rake. \$ doz. \$3.00
Gibbs' Hustler No. 0. \$ doz. \$4.25
Gibbs' Hustler No. 1. \$ doz. \$4.40
Gibbs' Hustler No. 2. \$ doz. \$6.00

Razors—

Campbell Cutlery Co. 50¢
Electric Cutlery Co. Net prices
Galvanic. \$ doz. \$1.00
Jordan's AAA, new list. Net prices
Jordan's Old Faithful, new list. Net prices
J. R. Torrey Razor Co. Net prices
Wostenholm and Butcher, \$10 to \$20. 10¢

Razor Strops—

See Strops, Razor.
Reels—
Clothes Line—
Steans'. 83¢ & 10¢
Fishing

Hendryx, Aluminum, German Silver, Gold, Bronze, Silver, Rubber, Populo and Salmon, Single Action, Multiplying and Quadruple, all sizes. 25¢
Hendryx, Single Action Series. 102P and PN, 202P and PN, 102PR and PRN, 202PR and PN, 304P and PRN, 00304P and PN, 602P and 502N, 802P and 502N, 02084N, Competitor. 50¢
Hendryx, Multiplying and Quadruple Series. 3004N and PN, 14N and PN, 2504N, 2504P and PN, 002904PN, 0924 and 0924N, 5000N and PN. 40 & 10¢

Registers—

Moore's Bronze Finishes. 75¢
Moore's Electropolated. 80¢
Moore's Jappanned. 80¢
Moore's Solid Bronze. 70¢
Moore's Stove Pipe. 83¢ & 10¢

Rings and Ringers—

Bull Rings—
Hotchkiss' low list. 40¢
Humason, Beckley & Co.'s. 75¢
Peck, Stow & W. Co.'s. 60¢ & 60¢ & 10¢
Sargent's. 8¢ @80¢ & 10¢

Hog Rings and Ringers
Note.—The market on Hog Rings and Ringers is in a demoralized condition and prices are low and irregular. We therefore withdraw quotations for the present.

Rivets and Burrs—

Coppered Iron, Bedina Brand. 60¢ & 50¢
Coppered Iron, Norway, 1st Nov. 17 '87. 65¢ & 10¢
Second Quality. 70¢ @70¢ & 10¢

Rivet Sets—See Sets.**Roasting and Baking Pans—See Pans, Roasting and Baking.****Rods—**

Stair, Black Walnut. \$ doz 40¢
Stair, Brass. 25¢ & 30¢

Rollers—

Acme Moore's Anti-Friction. 50¢ & 10¢

Barn Door, Sargent's list. 60¢ & 10¢ & 10¢

Moore's Barn Door Stay. 50¢

Union Barn Door Roller. 70¢

Thompson Mfg. Co.'s Lawn Roller. 30¢

Wheel. 40¢

Hay Fork, Moore's Anti-Friction 5 in. 20¢

Wheel. 40¢

Hay Fork, Reed's Self-Lubricating. 60¢

Hay Fork, Solid Eye. 40¢; Swivel, \$4.50. 60¢ & 10¢ @50¢ & 10¢ & 5¢

Hay Fork, Solid Eye. 40¢; Swivel, \$4.50. 60¢ & 10¢ @50¢ & 10¢ & 5¢

Hay Fork, Stearns' Nos. 35 & 45. 50¢ & 10¢

Hay Fork, Stearns' Nos. 15, 25, 55, 65, 60¢

Hay Fork, Tarbox Pat. Iron. 20¢

Hot House, Awning, &c. 66¢ @67¢

Japanned Clothes Line. 60¢ @68¢

Japanned Screw. 70¢ @8¢

Japanned Side. 70¢ @8¢

Moore's Ceiling or End, Anti-Friction 40¢

Moore's Dumb Waiter, Anti-Friction 50¢

Moore's Electric Light. 88¢ @89¢

Moore's Side, Anti-Friction. 50¢

Sash (Auger Mortise). On bbl. lots ex. 5¢

Common Sense. 60¢

Empire. 60¢

Acme. 60¢

Ideal, Nos. 2, 4, 10 & 15. 60¢ less 1¢

Star. doz. net.

Ideal, or IXL No. 60. \$ doz. 22¢ net.

Shade Rack. 45¢

Shepard's Niagara, No. 25. \$ doz 25¢ net

Tackie Blocks—See Blocks.

Wire Rope—

List Sept. 1, 1894. All kinds.

20¢ & 24¢ & 22¢, cash

Rules—

Boxwood. 50¢ & 10¢ @80¢ & 10¢ & 10¢

Ivory. 50¢ & 10¢

Starrett's Steel Rules and Straight Edges. 25¢ & 10¢

Sad Irons—See Irons, Sad.

Sand and Emery Paper and Cloth—

See Paper and Cloth.

Sash Cord—See Cord, Sash.

Sash Locks—See Locks, Sash.

Sash Weights—

See Weights, Sash.

Sausage Stuffers or Fillers—See Stuffers or Fillers, Sausage.

Saws—

Note.—Extra 5@10% often given.

Atkins' Circular. 50¢ & 10¢

Atkins' Band. 50¢ & 10¢

Atkins' Cross Cuts, new list. 40¢

Atkins' Mulay, Mill and Drag. 50¢ & 10¢

Atkins' One-Man Saw. 40¢

Atkins' Wood Saws. 40¢

Atkins' Hand Compass, &c. 40¢

Diston's Circular. 45¢ @45¢ & 5¢

Diston's Cross Cut, list Jan. 1, '93. 40¢ & 10¢

Diston's Hand. 25¢

C. E. Jennings & Co.'s. 25¢

Peace Circular and Mill. 45¢ @45¢ & 5¢

Peace Cross Cuts, list Jan. 1, '93. 45¢ @10¢

Peace Hand, Panel and Rip. 25¢ @25¢ & 5¢

Richardson's Circular and Mill. 45¢ @45¢ & 5¢

Richardson's X Cuts, list Jan. 1, '93. 45¢ @10¢

Richardson's Hand, &c. 25¢ & 25¢ & 5¢

Simonds' Circular Saws. 45¢ @45¢ & 5¢

Simonds' Crescent Ground Cross Cut Saws. 30¢

Simonds' One Man Cross Cuts. 40¢ & 10¢

Simonds' Gang, Mill, Mulay and Drag Saws. 45¢ @45¢ & 5¢

Wheeler, Madsen & Clemson Mfg. Co. 40¢

Cross Cuts, list Jan. 1, 1893. 45¢ @10¢ & 10¢

Panel, and Rip. 30¢ & 10¢

Woodrough & McFarlin. 25¢ & 10¢

Cross Cuts, list Jan. 1, 1893. 45¢ @10¢ & 10¢

Hand, Panel and Rip. 25¢ & 10¢

Hack Saws—

Eureka and Crescent. 25¢

Griffin's, complete. 40¢ & 10¢

Griffin's Hack Saw Blades. 40¢ & 10¢

Star Hack Saws and Blades. 25¢

Scro!l! Barnes' No. 1, \$1; No. 2, \$10; No. 7, \$15. 25¢

Barnes' Scroll Saw Blades. 25¢

Lester, complete. 25¢

Rogers, complete. 24¢. 25¢

Hack Saws—

See Frames, Saw.

Saw Sets—See Sets, Saw.

Saw Tools—See Tools, Saw.

Scale Beams—

See Beams, Scale.

Scales—

Chatillon's Eureka. 25¢

Chatillon's Favorite. 40¢

Chatillon's Grocer's Trip Scales. 50¢

Family Turnbuls. \$1.50 & 20¢

Hatch, Counter, No. 171, good quality. \$ doz \$17.00 @ \$18.00

Hatch Tea, No. 161. \$ doz \$8.00 @ \$8.50

Riehle Bros' Platform. 40¢ & 10¢ & 10¢

Union Platform Plain. \$2.00 @ \$2.10

Union Platform, Striped. \$2.15 @ \$2.25

Standard. 50¢

Heinisch's, List Dec. 1881. 60¢ & 10¢ & 10¢ & 10¢

Heinisch's Tailor's Shears. 55¢

Hove Bros' and Hubert, Solid Forged Steel. 40¢

Seymour's, List Dec. 1881. 60¢ & 10¢ & 10¢ & 10¢

Victor Cast Shears. 75¢ @10¢ & 8¢

Tinners, Snips—

Cast Handles, Laid with Steel. 40¢

Niagara Snips and Shears. 20¢ & 10¢

Steel Laid, Clauss. 70¢

W. H. Laid, Steel Blades. 20¢ & 10¢

Screen Window and Door Frames—See Frames.

Screw Drivers—

See Drivers, Screw.

Screws—

Bench and Hand—

Bench, Iron. 55¢ & 10¢ & 55¢ & 10¢ & 10¢

Bench, Wood, Beech. \$ doz \$2.50

Bench, Wood, Hickory. 50¢ & 10¢ & 10¢

Hand, Wood. 25¢ & 10¢ & 25¢ & 10¢ & 5¢

Hand, Grand Rapids, list. 35¢

Rivets, Fluting Scrapers—

Admirable Box Scraper (S. R. & L. Co.). \$ doz \$1.00

Heinisch's Tailor's Shears. 55¢

Hove Bros' and Hubert, Solid Forged Steel. 40¢

Steel. 40¢

Seymour's, List Dec. 1881. 60¢ & 10¢ & 10¢ & 10¢

Diagonal Combined Pruning Hook and Saw. 60¢ & 25¢ & 20¢

Diagonal Pruning Hook, W. doz. \$1.00

Diagonal Pruning Hook. 60¢ & 25¢ & 20¢

Dunlap's Saw and Chisel. \$ doz \$1.50 & 50¢

Electric Pruning Shears. 50¢ & 10¢ & 5¢

Henry's Pruning Shears. \$ doz \$1.00 & 50¢

Pruning Shears. 50¢ & 10¢ & 5¢

Pr

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

<https://books.google.com>

